

INSTITUTE OF POWER MACHINERY AND MECHANICS

**Institute
Director** **Doctor of Philophy (Technical) Professor
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- Institute
Departments
and Divisions**
- **Steam Generator Design Department (SGD)**
 - **Steam and Gas Turbines Department (SGT)**
 - **Hydrodynamics and Hydraulic Machines Department (HHM)**
 - **Machine Design Fundamentals Department (MDF)**
 - **Theoretical Mechanics and Mechatronics Department (TMM)**
 - **Dynamics and Strength of Machinery (DSM)**
 - **Metals Technology Department (MTD)**
 - **Engineering Drawing Department (ED)**
 - **Research & Development Academic Center of Geothermal Energetic (CGE)**

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At SGD Department:
9 teachers,
4 researchers,
3 Ph.D. students.

Head of department
Doctor of Technical Sciences,
Professor Pavel V. Roslyakov

■ Main Lines of Research

Research Supervisor

- **Development and implementation of highly efficient environmentally friendly technologies for organic fuels firing**
Professor Roslyakov P.V., Senior researcher Molchanov V.A.
- **Reliability and operation effectiveness increase for the steam boilers of TPP**
Professors Dvoinishnikov V.A., Iziumov M.A., Roslyakov P.V.,
Senior researcher Molchanov V.A.
- **Development of computer-aided-design technologies for the power machinery equipment**
Professor Izumov M.A., associated-professor Kniazkov V.P.
- **Mathematical modeling of the nitrogen and sulfur oxides, the polycyclic benzene polycarbons process formation at fuel firing in the power engineering equipment**
Professor Roslyakov P.V.
- **Development of the mathematical models and the software support for the estimation, substantiation and technical decision making at stem boiler design**
Professors Dvoinishnikov V.A., Iziumov M.A.
- **Development of computer-aided expertise-diagnostic system for the steam boiler and its elements**
Professor Dvoinishnikov V.A.
- **Development and implementation of continuous monitoring and regulating systems for TPP harmful pollutants into the environment.**
Professor Roslyakov P.V.

■ Agreements, contracts, projects supported by the state budget

- Development of the mathematical modeling methods for heat-and-mass exchange processes at organic fuel firing
- Development of technology for creation the automated continuous monitoring system of power engineering objects emission
- Development of mathematical modeling methods for harmful substances formation at organic fuel firing
- R & D complex for the substantiation and expertise of the main engineering designing decisions in conformity to gaseous masout and coal-fired boilers
- Analytical and calculation investigations of the operating processes in conformity to the unified series of hot-water gaseous masout boilers with the heating efficiency 35, 60, 120, and 200 Gcal/h

- R&D complex for the substantiation and expertise of the main engineering and design solutions in conformity to the implementation of waste scheme coupling with gas turbine installation
- Combined research of boiler ecology features and development of recommendations to decrease the harmful wastes into atmosphere
- Development of small-cost methods of non-traditional fuels firing methods to increase the ecological safety of boiler operation
- Combined testing and the main and auxiliary boiler equipment adjustment on Diagilev co-generation plant

■ Key publications

- *Roslyakov P.V., Zakirov P.V., Ionkin I.L., Egorova L.E.* Investigation of conversion processes of carbon oxide and benzapilene oxides along the boiler installation gas channel // *Teploenergetika*. 2005. No 4. Pp. 44–50.
- *Roslyakov P.V., Zakirov I.A., Ionkin I.L., Egorova E.E.* The total harmfulness estimation of the outgoing gases in boiler installation // *Teploenergetika*. 2005. No 9. P. 30–34.
- *Unified* series of bent-tube boilers for the averaged pressure of the superheated steam and their mutual operation with GTU in the steam-gas installation structure / V.A. Dvoinishnikov, M.A. Iziumov, V.P. Knaz'kov etc. // *Energomashinostroenie*. 2005. No 1. P. 37–44.
- *Steam* and hot-water boilers in the power engineering installation together with gas turbines 6 MW in power / Yu.V. Petrov, V.I. Shiolokov, S.A. Evdokimov etc. // *Gasoturbinnyye tekhnologii*. 2005. No.2. P. 22–24.
- *Roslyakov P.V., Ionkin P.V., Zakirov I.A., Egorova L.E.* Numerical modeling of swirling flow in the chimney stock // *Proc. of 2th Russian Conf. «Heat exchange and hydrodynamics in the swirling flows»* MPEI Publishing house, 2005. P. 144–145.
- *Dvoinishnikov V.A., Popov E.A.* Standard technical solution application at designing of boiler aggregates operation together with the gas turbine installations // *Proc. Intern. conf. «Information means and technologies»*, Publishing House «Yanus-K», 2005. vol. 1. P. 155–158.
- *Systematic* recommendation to the nitrogen oxide ejection calculation under the smoke fumes of the TPP boilers. CO 153-34.02.304–2003 // V.R. Kotler, Yu.P. Enikin, Yu.M. Usman etc.: «All-Russian Heat Technology Institute», 2005. 40 p.
- *Rosliakov P.V., Ionkin I.L., Zakirov I.A., Morokhovets Yu.E.* Functioning algorithm for the continuous TPP emission monitoring system // *Zapiski gornogo instituta*. 2005. Vol. 166. P. 122–125.
- *Larkov A.V., Dvoinishnikov V.A., Kniaz'kov V.P.* Mathematical model of the heating process in the boiler with ЦКС and its implementation in the software complex // *Proc. of XII Intern. conf of graduate and Ph.D. students*. Publishing House «Znak», 2006. V. 3. P. 256–257.
- *Rosliakov P.V., Zakirov I.A., Ionkin I.L., Egorova L.E.* Irregularities investigation of substance concentration fields in the gas channel of the boiler installation. // *Teploenergetika*. 2006. No 5. P. 10–16.
- *Investigation of* velocity fields and firing products concentration in TPP smoke-stack / / P.V. Roslyakov, I.A. Zakirov, I.L. Ionkin etc. // *Teploenergetika*. 2006. No 5. P. 17–25.
- *Furnace* process organization in the substitution boiler of 300 MW power unit of Novocherkask TPP at culm – nature gas mixture firing / V.A. Dvoinishnikov, V.P. Kniaz'kov, V.A. Galkov etc. // *Teploenergetika*. 2006. No 6. P. 10–14.

- *Initial* conditions influence on the ignition and burning the culm dust at its firing together with the nature gas. / V.A. Dvoishnikov, V.P.Kniaz'kov, I.A. Gamazkov etc. // Teploenergetika. 2006. No 6. P. 18–22.
- *Rosliakov P.V.* The problem of the polluting substances measurement on TPP and its monitoring. // III Intern. Conf. and exhibition «Ecology in Power Engineering-2006»: Proc. and exhibition catalogue. «All-Russian Heat Technology Institute», 2006. P. 83–88.
- *Roalyakov P.V., Ionkin I.L., Novozhilova L.L.* Chimney aerodynamics influence on the monitoring reliability of TPP harmful emission // Proc. of Conf. on thermal power engineering NKTE–2006 / Under edition of Yu.G. Nazmeev and V.N. Shliapnikov, Kazan, Russia, 2006. Vol. II. P. 259–262.
- *Rosliakov P.V., Ionkin P.V., Egorova L.E.* Natural gas burning with the moderate tested chemical under-burning // ib. P. 281–283.

■ Partners

- RAO «EES OF Russia», Moscow
- «Power Machines» concern, Moscow
- «Power Machinery Alliance», Moscow
- Federal State Enterprise «Opytnoe Konstruktorskoe Buro «Hydropress», Podolsk town. Moscow region.
- «Engineering Company ZiOMAR», Podolsk town, Moscow region.
- «Technopromexport», Moscow
- «All-Russian heat engineering R&D institute, Moscow
- «Energeticheskiy Institut imeni Krzhizhanovskiy, Moscow
- «Special'noe konstruktorskoe buro VTI», Moscow
- ORGRES Company, Moscow
- «Institut Teploenergoproject», Moscow
- «Tsentral'noe konstruktorskoe buro Energoremont», Moscow
- «Mosenergo», Moscow
- «Riazanenergo», Riazan city
- «Tatnenergo», Kazan city
- «Chepetskiy mekhanicheskiy zavod», Glazov town

At STG Department:

19 teachers,

12 researchers,

12 Ph.D. students.

Head of Department

Doctor of technical sciences, professor

Vladimir G. GRIBIN

■ **Main Lines of Research**

Research Supervisor

- **Development and investigation of steam and gas units of new generation with super-critical steam parameters**

Professors Kostiuk A.G., Gribin V.G., Trukhniy A.D.

- **Development of calculation methods and investigation of steam and gas units of heat-recovery type**

Professors Trukhniy A.D., Gribin V.G.

- **Aerodynamical perfection of turbo-machine setting: blading, steam-distribution system, inlet, outlet and transition jets and compactions of steam and gas turbines of various purposes**

Professors Zariankin A.E., Gribin V.G.

- **Steam-distribution system effect investigations in steam turbines on the vibration reliability and the monitoring system development for turbo aggregates vibration conditions**

Associated-Professor Kasilov V.F.

- **Resource extension and reliability increase of the steam turbines**

Professors Trukhniy A.D., Kostiuk A.G.

- **Flow computer modeling in low pressure cylinders setting of the powerful steam turbines**

Associated-Professor Bogomolova T.V.

- **Development and perfection of new regulating systems and modernization of existing ACS for steam and gas units**

Professor Bulkin A.E.

■ **Agreements, contracts, projects supported by the state budget**

- Theoretical-calculation and experimental research of the promising power engineering units providing the high efficiency and reliability of power equipment
- Development of scientifically reasonable validation of promising steam unit creation with super-high steam parameters
- Calculation investigations of various gas turbine units and steam turbine units variants for mini co-generation plant
- Investigations of consumed and vibration characteristics of new regulating valves for steam turbines
- Investigations of the perforated and lamellar protect grid influence on the effectiveness and reliability of steam inlet system in steam turbines
- Experimental investigations and optimization of outlet jet of transport gas-turbine unit
- Research of anti-swirling lattice effect on the regulating valve and outlet jets features in steam turbines
- Analysis of the deflected mode and drive shafting defect accumulation depending on the variation of operating decenterings of K-500-65 turbine

- Investigation and calculation of the promising steam turbine last stages
- Investigations of gas-dynamical setting elements for increasing the effectiveness of powerful steam turbine stages
- Research and development of engineering solutions to increase the effectiveness and reliability of setting elements for powerful steam turbines
- Combined investigation for creation of new steam turbine unit generation with the super-high steam parameters
- Development of the system approach adaptation methods to designing the power engineering machines using the modern computer technologies

■ Key publications

- *Zariankin A.E., Simonov B.P.* Regulating valves of steam turbines. MPEI Publishing House, 2005. 322 p.
- *Zariankin A.E., Gribin V.G.* Gas dynamics of ideal liquid. MPEI Publishing House, 2005. 120 p.
- *Kostiuk A.G.* Some vital problems of designing and modernization of steam turbines // *Teploenergetika*. 2005. No 4. P.16–27.
- *Kostiuk A.G.* Some vital problems of steam turbines // *Energomashinostroenie*. 2005. No 1. P. 7–12.
- *Kostiuk A.G., Trukhniy A.D.* Comparison of active and reactive high pressure cylinders of steam turbines // *Teploenergetika*. 2005. No 6. P. 2–13.
- *Lunin I.A., Trukhniy A.D., Lebedeva A.I., Fedorov M.V.* Operation conditions influence of turbines T-250/300-23,5 TM3 line heat booster on their pipe system resource // *Teploenergetika*. 2005. No 7. P. 70–75.
- *Zaryankin A.E., Paramonov A.N., Arianov S.V., Gotovtsev A.M.* Effect of the Punched Disk Vortex Dampeners at Vibrostability of Remote Control Valves of Steam Turbines // Conf. with Intern. Participation «Power System Engineering — Flued Flow — Heat Transfer — 2005». UWB in Pilsen Univerztni. Vol. 22. P. 165–169.
- *Zaryankin A.E., Arianov S.V., Sidorova E.K., Shalchub T.V.* Functional Characteristics of Turbulent Interface and Airodynamic Design Principle of Power Equepment Suncom-2005 Lodz. 2005. P. 319–324.
- *Trukhniy A.D., Barinberg G.D., Rusetskiy Yu.A.* Usage expediency Investigation of the outlet gases of gas turbine unit to heat the feed-water in steam turbine unit with T-110/120-12,8 turbine // *Teploenergetika*. 2006. No 2. P. 16–20
- *Trukhniy A.D., Mikhailov I.A.* Profile choice of manoeuvre steam-gas units for new Russian electrical plants // *Teploenergetika*. 2006. No 6. P. 45–49.
- *Troitskiy A.N., Maksimov I.S.* Experimental investigations of non-condensed gases influence on the turbine stage operation // *MPEI Vestnik*. 2006. No 1. P. 5–12.
- *Gvozdev V.M., Kasilov V.F.* Development, experimental-industrial testing and implementation of automated testing and monitoring systems for turbo aggregates K-210-12,8 // *Teploenergetika*. 2006. No 2. P. 65–72.
- *Dmitriev S.S., Ustinov A.Yu.* Total pressure pulsation measurement along the boundary layer height on the turbine blade wall // *MPEI Vestnik*. 2006. No 2. P. 25–31.
- *Bogomolova T.V., Tsirkov M.B.* Comparative analysis of combined unit schemes with the various deaerator operation conditions // *MPEI Vestnik*. 2006. No 3. P. 15–21.
- *Gribin V.G., Gorshkov A.N.* Combined unit 450 of Kaliningrad TPP-2. Energy combined unit of high power on the basis of GT-160 // *Gasoturbinnye tekhnologii*. 2006. No 6. P. 3–6.

- *Nitusov V.V., Gribin V.G.* Constructive Method of Decreasing Dynamic Stresses in the Rotors Blades of Turbomachine // Proceedings of ASET. 2006. P. 227–234.

■ Dissertations

- *Maksimov I.S.* Non-condensed gases influence on the turbine stage operation effectiveness: Cand. Sci. (Techn.) Dissertation. 2006.
- *Gotovtsev A.M.* Development and investigation of steam flow stabilization systems in remote regulating valves of the steam turbines. Cand. Sci. (Techn.) Dissertation. 2006.
- *Gvozdev V.M.* Perfection and development of monitoring system of the power turbine technical conditions. Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- «Leningradskiy metallicheskiy zavod», Sankt-Peterburg
- «Shkoda» company, Czech Republic
- RAO «EES Rossii», Moscow
- «Mosenergo», Moscow
- Federal State Enterprise «SALUT», Moscow

■ Unique Equipment

- Unique experimental steam and air turbines having no the world's analogues
- Experimental centrifugal compressors driven by steam turbines and electric motors
- Experimental facilities for investigation of a flow in elements of turbine path,
- rotating and fixed blade cascades, control valves, and exhaust hoods, for studying the static strength of turbine components under different loading conditions
- Experimental facilities for investigation of the turbines vibration reliability – setup for dynamical model of tightening and model of multispan rotor

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At HHM department:

18 teachers,

1 researcher,

5 Ph.D. students.

Head of department

Doctor of Philosophy (Technical),

Professor Alexander M. GRIBKOV

■ Main Lines of Research

Research Supervisor

- **Fundamental research in the field of hydro-gas-dynamics and development of methods for liquid and gas flow description with increased adequacy degree to the real processes**

Professor Morgunov G.M.

- **Hydro-dynamics of flows in thin layers of viscous liquid**

Professor Emtsev B.T.

- **Development of new kinds on electric-hydraulic drives and its parts for various purposes**

Professor Golubev V.I.

- **Development of hydro-power installations of increased efficiency and reliability**

Professor Morgunov G.M., Associated-Professor Orakhelashvili B.M.

- **Theoretical bases formation, research and development of autonomous electrical-hydraulic drives**

Associated-Professor Zuev Yu.Yu.

- **Physical effects research and hermetic electric pump development with non-traditional energy conversion**

Associated-Professor Zuev Yu.Yu.

- **Theoretical bases development for creation of the competitive hydro-machine and hydro-driving products**

Associated-Professor Zuev Yu.Yu.

- **Characteristic investigation and creation of automatics logical schemes on the basis of fluid technique elements**

Associated-Professor Davydov A.I.

- **Development of high-reliable counters fire- and highly-explosive media**

Associated-Professor Ziubin I.A.

- Investigation of pump equipment and hydraulic system elements operation influence on functioning reliability of TPP main technological cycles

Associated-Professor Pankratov S.N.

■ Agreements, contracts, projects supported by the state budget

- Scientific basis of the parametric synthesis methods at creation of the competitive equipment
- Development the calculation technique for the main parameters of hydraulic dispatcher with the common slide valves

- Development the methods of the structural-parametric synthesis considering the creation specifics of the competitive hydraulic machines and hydraulic-pneumatic automatic systems
- Manual for academic-demonstration bench usage for the rotary pump with the frequency control
- Structure synthesis of mobile object hydraulic drives on the basis of the formalized energy-information chains

■ Key publications

- *Morgunov G.M.* Socio-synergetics and education. MPEI Publishing House, 2005. 152 p.
- *Dunaev A.N., Glukhov M.V.* Pumps for chemistry and petrochemistry — 2005: reference book. Publishing House «Internet magazin tekhnicheskoy literatury», 2005. 270 p.
- *Dunaev A.N., Markov D.V., Mogilchenko, Glukhov M.V.* Catalogue of Hydrogas plant products for specialists: reference. Voronezh: Hydrogas Publisher, 2005. 64 p.
- *Zuev Yu.Yu.* Bases of competitive products creation and making the effective solutions. MPEI Publishing House, 2006. 400 p.
- *Golubev V.I., Vissarionov V.I., Ziubin I.A., Cherkasskikh S.N.* Hydraulic transmissions for wind energy installations // *Tiazheloe mashinostroenie*. 2005. No 10. P. 16—18.
- *Methods* of line pump adaptation to the real conditions of the heat line / A.V. Volkov, A.I. Davydov, M.Yu. Pomortse, S.K. Trishkin // *Elektricheskie stantsii*. 2005. No 11. P. 52—56.
- *Morgunov G.M.* Increasing of economical efficiency and ecological safety of fluid medium kinetic energy usage. // *MPEI Vestnik*. MPEI Publishing House. 2005. No 3. P. 25—32.
- *Pankratov S.N.* Pump choice for hydraulic system // *Energosluzhba predpriyatiya*. 2005. No 1. P. 42—44.
- *Pankratov S.N., Volkov A.V.* Analysis of pump equipment damages on the heat energy objects // *Tiazheloe mashinostroenie*. 2005. No 10. P. 2—6.
- *Pankratov S.N., Volkov A.V.* Analysis of feed pump damages on the thermal power engineering objects // *Energosluzhba predpriyatiya*. 2005. No 5. P. 42—46.
- *Piatigorskaya E.I., Golubev V.I.* Efficiency of the labyrinth pump // *Khimicheskoe i neftianoe mashinostroenie*. 2005. No 5. P. 21—33.
- *Morgunov G.M.* Francis turbine of the double regulation and its features // *MPEI Vestnik*. MPEI Publishing House. 2006. No 3. P. 5—14.
- *Hydro-gas* dynamics, hydraulic machines and hydro-pneumo systems // *Proc. of intern. conf.* MPEI Publishing House, 2006. 256 p.
- *Pankratov S.N., Volkov A.V.* Hydro-dynamic feature analysis of the line pumps in power units 100 Mw in power // *Nasosy i oborudovanie*. 2006. No 2. P. 25—27.
- *Pankratov S.N., Volkov A.V.* Analysis of impeller pump damage // *Energosluzhba predpriyatiya*. 2006. No 3. P. 32—34.
- *Pankratov S.N., Volkov A.V.* Permanent resource of the impeller pumps // *Energosluzhba predpriyatiya*. 2006. No 4. P. 36—38.

■ Patents

- *Patent 2258156 RF.* Hydro-drive reciprocal pump of double action / Yu.A. Petrov, P.I. Shpak, V.I. Golubev V.I. A.V. Popov // *BI*. 2005. No 22.

- *Patent 2245454 RF.* Direct-flow turbine / G.M. Morgunov. 2005.
- *Patent 2269026 RF.* Impeller of double regulation hydro-turbine / G.M. Morgunov / / BI. 2006. No 3.
- *Patent 2269098 RF.* Spray oscillator and oscillatory flowmeter on its basis / I.A. Ziubin. 2006.

■ Dissertations

- *Volkov A.V.* Development of methods of increasing the effectiveness and reliability of thermal power pumping equipment: Dc. Sci. (Techn.) Dissertation. 2006.
- *Soliar S.V.* Operating process investigation and development of calculation method for the main design parameters of hydro dispatcher with common slide valve on the elastic bracket: Cand. Sci. (Techn.) Dissertation. 2005.
- *Pomortsev M.Yu.* Influence of pH characteristics of the operating media on the energy-cavitation features of impeller pumps: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- Central research institute of automatics and hydraulics, Moscow
- SPO «Gidromash», Moscow
- OAS RAO «UES of Russia», Moscow
- «Mosenergo», Moscow
- «Sigma» company, Czech republic
- «FESTO» company, Germany «MAGI» company, Moscow «Grundfos» company, Denmark

■ Unique Equipment

- The efficiency and cavitation test stands for investigation of hydraulics turbines, reversible hydromachines and high specific speed pump.
- The test bench for power and dynamic studies of hydraulics drive systems and control devices for high pressure positive-displacement-rotary pumps.
- The test bench for examining liquid flow meters and counters.
- The test bench for investigation of centrifugal pumps with speed regulation.

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At MDF department:
15 teachers,
1 researcher.

Head of department
Doctor of philosophy (technical),
Professor Dmitriy D. KORZH

■ **Main Lines of Research**

Research Supervisor

- **Investigation of electrical equipment construction efficiency under dynamic influences**
Professor Kudriavtsev E.P.
- **Development of special purpose details and units from the composite and traditional materials**
Professor Nikolaev V.P.
- **Strength and reliability investigation for construction elements from composites**
Professor Nikolaev V.P.
- **Laboratory and research investigations equipment design**
Professor Nikolaev V.P.
- **Creation of the resource estimation methods of the power engineering equipment elements for alternate and stationary operating modes**
Associated-Professor Korzh D.D.
- **Development of the design approaches for the technical systems**
Associated-Professor Khoroshev A.N.
- **Development and creation of scientific bases for machinery profile designers training**
Associated-Professor Khoroshev A.N.

■ **Agreements, contracts, projects supported by the state budget**

- Development of scientific approaches for the efficient reliability estimation systems of power plant equipment basing on the monitoring results
- Structural components analysis and investigation for the laboratory jobs on machine details and development of methodic bases of its fulfillment using the computer technologies
- Development of combined laboratory equipment – class for automated design for lecture course «Bases of designing»
- Devices development and approbation for circular and tubular specimens testing made from the reinforced composite materials on the basis of the polymer matrix
- Development of equipment set for the determination of the mechanical features set of the composite reinforced materials on the basis of the polymer matrix
- Perfection of scientific researches in the field of engineers-designer training for the machinery universities on the basis of inter-university center of automated design
- Development of the general principles of composite reinforced materials application in power machinery

- General principles of construction designing from the composite reinforced materials
- Development of methodical support for the students training in automated designing on the basis of the center of automated design. Development of the software for designing the mechanisms and thermal engineering equipment.

■ Key publications

- *Grebenkin V.Z.* Quality control for goods assembling: MIET Publishing House, 2005. 152 p.
- *About* the problem of short-circuit current levels coordination in power systems / B.N. Neklepaev, K.V. Antipov, V.V. Zhukov, E.P. Kudriavtsev etc. // Elektricheskie stantsii. 2005. No 4. P. 6–15.
- *Dolin A.P., Kudriavtsev E.P., Kozinova M.A.* Calculation of electrodynamic stability and other parameters of hard jumper of distribution systems of high and ultra-high voltage. // Elektricheskie stantsii. No 4. 2005. P. 18–24.
- *Kudriavtsev E.P., Neklepaev B.N.* Estimation of mechanical loads on electrical equipment insulators due to the lowering of the open distribution devices at short circuits // Promyshlennaya energetika. 2005. No 12. P. 7–12.
- *Korzhd D.D., Kochetov A.A.* Computer means for estimation of thermal cycling resource of the steam turbines rotors with account of real load // Tiazheloe mashinostroenie. 2006. No 1. P. 7–11.
- *Kochetov A.A., Korzh D.D., Egorov A.V.* Erosion deterioration decreasing for long blades of the last stages by means of optimal hanging // Elektricheskie stantsii. 2006. No 11. P. 36–41.

■ Patents

- *Patent 2266442 RF.* Vibration insulator and its application method. / V.S. Pichugin, A.G. Korobeinikov, B.P. Nikolaev, A.A. Karpov. 2005.
- *Authors* certificate № 2006612588 about the official registration computer software. Automated structural synthesis of mechanisms / D.D. Korzh, A.V. Kuznetsov. 2006.

■ Partners

- RAO «EES Rossii», Moscow
- Engineering strength center of Ministry of atomic energy, Moscow
- Federal state enterprise «Coordination analytic center on research programs of Ministry of Education», Moscow

■ Unique Equipment

- Facility for testing of shafts with a cross-linked structure for torsion
- Tools for testing specimens from composite materials
- The center of the automated designing (Department's CAD Center)

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At TMM department:
16 teachers,
1 researcher,
1 engineer,
9 Ph.D. student.

Head of Department
Doctor of Sciences (Phys.-Math.),
Professor Alexander I. KOBRIN

■ Main Lines of Research

Research Supervisor

- **Mechatronic control systems using computer systems of real time**
Professor Kobrin A.I.
- **Mobile robots and non-holonomous electromechanical object movement**
Professor Martynenko Yu.G., head of lab Orlov I.V.
- **Sensing element dynamic of navigation and movement control system**
Professors Martynenko Yu.G., Podalkov V.V., assoc-prof. Merkuriev I.V.
- **Computer modeling of joint body system. Creation of computer teaching and testing software**
Associated-Professors Osadchenko N.V., Koretskiy A.V.

■ Agreements, contracts, projects supported by the state budget

- New models, methods and algorithms if the tasks of orientation of the mobile robots control
- Dynamics and movement control of the mechatronic systems
- United academic-research center of fundamental scientific problems and high-qualified experts training in area of aviation and space technologies
- Stellar-inertial navigational system for the flying vehicles
- Problem of inertial, satellite and stellar-measuring navigational system combining for the space apparatus on the basis of the initial data
- Parameters identification for controlled mobile robots
- Theoretical and experimental investigations of the controlled autorotation modes for solid bodies system

■ Key publications

- *Martynenko Yu.G.* Development of theoretical-mechanical models of wheeled robots // Proc. Conf/ «Modern technologies in theoretical mechanics course teaching». Tula: TGU Publisher, 2005. P. 91—100.
- *Vorobiev V.A., Merkuriev I.V., Podalkov V.V.* Wave solid-state gyroscope errors at account of the resonator nonlinear oscillations // *Giroskopia i navigatsia*. 2005 No1 (47). P. 15—21.
- *Donnik A.S., Merkuriev I.V., Podalkov V.V.* Influence of Anisotropy on Dynamics and Accuracy of Hemispherical Resonator Gyroscope // 12th S.-Petersburg Intern. Conf. on Integrated Navigation Systems. 2005. P. 198—201.

- *Erantsev G.A., Martynenko Yu.G.* Investigations of manipulator self-oscillations at drilling // Radioelektronika, elektrotehnika i energetika: proc. of XI Intern. conf. of students and Ph.D. students. In 3 vol. MPEI Publishing House, 2005. V. 3. P. 254—255.
- *Kuznetsov A.A., Kirsanov M.N.* Remote testing system in kinematics // Ibid. P. 255—256.

■ Dissertations

- *Vorobiev V.A.* Nonlinear effects in dynamics of the micro-mechanical gyroscopes. Воробьев В.А. Нелинейные эффекты в динамике микромеханических гироскопов: Cand. Sci. (Techn.) Dissertation. 2006.
- *Donnik A.S.* Material anisotropy geometrical heterogeneity influence on the accuracy features of the wave solid-state gyroscope: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Keldysh Institute of applied mathematics of the Russian Academy of Science
- Institute of mechanics of the Lomonosov Moscow State University
- Moscow Electromechanics and Automatics Institute
- State Unitary Enterprise, «Moscow Experimental Design Office MARS», Moscow
- Federal Science – production Center «Ramenskoye Instrument – Engineering Design Bureau», Ramenskoye, Moscow region
- Velizi Technological University, Paris, France
- Jiaotun University, Shanghai, PR China
- Tsinghua University, PR China Enschede University, The Netherlands
- Federal scientific center «ЦНИИэлектроприбор», Sankt-Peterburg, Russia

■ Unique equipment

- Equipment for spraying thin diamond like films
- Mobile robots for International scientific technical festivals «Mobile robots – 1999, 2000»
- Handle for displaying efforts during computer modeling (virtual reality)
- Computer package «Universal Mechanism» for modeling the dynamics of complex linked bodies
- Strap down Inertial Navigation System for investigating the regimes of initial alignment and navigation
- Installation for investigating dynamic and accuracy characteristics of a dynamically tuned gyroscope
- Installation for investigating the processes of information transmission and reception in multiprocessor and multitasks real-time systems

At DSM department:
25 teachers,
14 Ph.D. students.

Head of department
Doctor of Science (Technical),
Professor Victor P. CHIRKOV

■ Main Lines of Research

Research Supervisor

□ **Fracture mechanics**

Academician RAS Bolotin V.V.

□ **Statistical dynamics and safety of machines and constructions**

Professor Chirkov V.P.

□ **Dynamics and stability of constructions**

Academician RAS Bolotin V.V.

■ Agreements, contracts, projects supported by the state budget

- Dynamical construction behavior analysis under the seismic influences
- Investigations of stability and after-critical behavior of deformed systems under essentially non-conservative loads
- Development of the damage analysis and the elements destruction danger estimation methods of the power engineering constructions at presence of external aggressive media influence
- Estimation methods development for the machines and constructions reliability indexes at static and dynamical influences
- Reliability estimation for the gas system constructions operating at complex climate and geological conditions
- Efficiency estimation and the permanent resource technique development for the steel ropes on the basis of the diagnostic monitoring
- Dynamics of the nonlinear multimass systems at pulse and vibration influences

■ Key publication

- *Bolotin V.V., Chirkov V.P., Radin V.P., Trifonov O.V.* Development of nonlinear models for the analysis of the construction dynamical reaction, damage and destruction under extreme influences // *Izvestia VUZov. Stroitel'stvo.* 2005. No 3. P. 4—11.
- *Bolotin V.V., Petrovskiy A.V., Radin V.P.* Stability and after-critical behavior of multi-stage solid body system under non-potential load // *Izvestia RAS. Seria Mekhanika tvordogo tela.* 2005. No 1. P. 174—187.
- *Bolotin V.V., Chirkov V.P., Radin V.P., Schugorev A.V.* Console rod stability at elastic tie under non-potential load // *Izvestia RAS. Seria Mekhanika tvordogo tela.* 2006. No 2. P. 84—92.
- *Pozniak E.V.* Development of semi-active dynamical seismic load damper for the building // *Stroitel'naya mekhanika i raschet sooruzheniy.* 2006. No 1. P. 37—42.
- *Trifonov O.V.* Modeling of high-rise constructions as a distributed damageable systems // // *Izvestia RAS. Seria Mekhanika tvordogo tela.* 2005. No 3. P. 178—188.

■ Dissertations

- *Taraday D.V.* Development of calculation-experimental methods of supporting bearing centering for the rotor systems to ensure its reliability at static and dynamical influences: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- Russian Academy of Architecture and Structural Sciences. Moscow.
- Science of Machines Institute named after Academician Blagonravov A.A. Moscow.
- Russian State Business Concern on Production of Electric and Heat Energy (ROSENERGOATOM). Moscow.
- DAO Central Design Office of Oil Equipment. OAO GAZPROM. Podolsk.
- All-Russian Research Institute of Natural Gas and Gas Technologies. OAO GAZPROM. Moscow.
- Research and Design Institute of Power Technology. Moscow.
- «Techsoft» company. Moscow.
- «Intron-Plus» company. Moscow

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(495) 362-7568, 362-7118, fax: (495) 362-8938;
E-mail: techmet@mpei.ru

At MT department:
19 teachers,
1 researcher,
2 Ph.D students

Head of department
Doctor of Technical sciences
Professor Victor K. DRAGUNOV

■ Main Lines of Research

Research Supervisor

- **Development of the precision technology complex of electron-beam welding of the heterogeneous materials**
Senior researcher Dragunov V.V.K.
- **Regularity investigation and new methods development for weld forming at the details electron-beam welding**
Senior researcher Dragunov V.K.
- **Electron-beam welding technology development for the large dimension details from the light alloys**
Associated-Professor Khokhlovskiy A.S.
- **Electron-beam welding technology perfection for the power equipment units from the heterogeneous steel**
Associated-Professor Goncharov A.L.
- **Precision technology development for diffusion welding**
Associated-Professor Novokreschenov V.V.
- **Pexpress-diagnostic methods development of the structural-mechanical metal state for the industrial equipment**
Professor Matiunin V.M.
- **Automated instruments creation for non-specimen testing of metal physical-mechanical features**
Professor Matiunin V.M.
- **Development and perfection of rolling technology and instrument calibration for hot-rolled pipes manufacture**
Professor Golubchik R.M.

■ Agreements, contracts, projects supported by the state budget

- Investigation of structural-mechanical state of metal construction
- Development of control methods of electronic-beam welding and material processing technological processes
- Technology development of electronic-beam welding of the protected module parts made from austenitic steel near 100 mm in thickness
- Methods development and implementation of carrying instruments for the express-estimation of metal mechanical properties directly in products
- Development of new ways for the perfection of hot-rolled tube industrial manufacture from alloyed steel

■ Key publications

- *Dragunov V.K., Goncharov A.L., Nemytov D.S.* Formation of Diffusion Interlayers in Electron Beam Welded Joints in Diaphragms of Steam Turbines // *Welding International*. 2005. Vol. 19(9). P. 717–723.
- *Dragunov V.K., Goncharov A.L., Nemytov D.S.* Diffusive layer formation in steam turbine welded diaphragm made by electronic-beam welding // *Tekhnologia mashinostroenia*. 2005. No 5. P. 53–59.
- *Dragunov V.K., Goncharov A.L., Sliva A.P., Miakishev Yu.V.* Thermal-electric current magnetic field modeling in the penetrated channel of electric-beam welding of the ferro- and paramagnetic steels // *Svarochnoe proizvodstvo*. 2006. No 5. P. 12–17.
- *Matiunin V.M., Bekpaganbetov A.U.* Magnetic-mechanical method for metal damage revelation for turbine blades at the early stages // *Tekhnologia metallov*. 2005. No 4. P. 41–44.
- *Matiunin V.M.* Metals mechanical properties determination using the spherical indenter indentation diagrams // *Tekhnologia metallov*. 2005. No 7. P. 37–42.
- *Golubchik R.M., Merkulov D.V., Chepurin M.V., Titova S.V.* Influence of assortment parameters of half-finished product insertion on the cyclic forming character. Proc. of Conf. «Modern metallurgy problems. Vol.8, Plastic deformation of metals. Dnepropetrovsk. System technologies. 2005. P. 397–401.
- *Oparichev A.B., Karimbekov M.A.* Thermal electric effectiveness of film obliquely-condensed transducers from isotropic and anisotropic materials // *Prikladnaya fizika*. 2005. No 3. P. 109–112.
- *Matiunin V.M.* Operative diagnostics of construction material mechanical properties. MPEI Publishing House, 2006. 214 p.

■ Dissertations

- *Goncharov A.L.* Structural and mechanical heterogeneity decreasing for the weld from the heterogeneous steels on the basis of the electron-beam welding technology perfection: Cand. Sci. (Techn.) Dissertation. 2005.
- *Bekpaganbetov A.U.* Operative estimation of metal structural-mechanical state for thermal power equipment and pipelines after long operation: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- Bauman Moscow State Technical University
- Joint-stock Company «NPO Energomash» (Khimki)
- High Technical School (Konstanz, Germany)
- Baikov Metallurgy and Material Sciences Institute, RAS, Moscow
- Institute of electrical welding named by E.O. Paton (Kiev, Ukraine)
- Technical University (Budapest, Hungary)
- Physico-technical institute (Minsk, Republic Belarus)
- Blagonravov Institute of machines (RAS, Moscow)
- State Center of science «Research-and-production association on mechanical engineering technology» (Research-and-production «TSNIITMASH», Moscow)
- Joint-stock Company «Aeroelectric» (Moscow)
- Federal State Enterprise «Dollegal R&D institute, Moscow
- United Nuclear Research Institute, Dubna town

■ Unique Equipment

- Electron beam plant «Langepen» for metals' welding (electrical power is 45 kilowatt);
- Multipurpose testing machine «Instron» for mechanical tests of materials with program control;
- Stationary and portable devices for non-destructive rapid assessment of physical-mechanical properties of structural materials;
- Plant for diffusion welding «SVDU-26M»

At EG department:
29 teachers.
Head of department
Elena P. KASATKINA

■ **Main Lines of Research**

Research Supervisor

- **Methods development for pre-university training in the field of engineering drawings**
- **Development of teaching technique in engineering drawing discipline with account of natural cognitive logic**

Kasatkina E.P.

Associated-Professor Gornov A.O.

■ **Key publication**

- *Gornov A.O.* Whether the problem of design skill teaching who cannot draw can be solved? // *Informatsionnye sredstva i tekhnologii: Proc. of Conf.: Yanus-K Publisher, 2005. Vol. 2. P. 106—110.*
- *Ochkov V.F., Kaurkin V.N., Piskov V.N.* Application of new possibilities of graphical frame SHELL for power equipment studying // *Ibid. P. 111—113.*
- *Kasatkina E.P., Pavlova A.A.* Status and tendency of graphical studying in the secondary school // *Ibid. P. 121—123.*
- *Presnov F.I.* Academic and creative components at teaching the theme «Drawing of assembly units» in the section «Bases of development of design documentation» of the «Engineering Drawing» course // *Ibid. P. 124—127.*
- *Kasatkina E.P., Stepanov Yu.V., Baranova N.B.* Unification of informational methodical spaces of different disciplines on the stereometry tasks solution as an example // *Ibid. 2006. Vol. 1. P. 119—122.*
- *Kaurkin V.N.* About the optimal methods of working in AUTOCAD systems // *Ibid. 2006. V. 1. P. 123—125.*
- *Pivovarov V.P.* Development of design documents for printed board manufacture // *Ibid. 2006. V. 1. P. 126—130.*
- *Presnov F.I.* Application of the multi-layer graphical files as a component of interactive teaching technique at studying of the section «Theory of the drawing creation» in AUTOCAD system // *Ibid. 2006. V.1. P. 135—138.*

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At GTE:
5 researcher,
5 engineers and technicians.

Scientific supervisor
Doctor of Sciences (Technical), Professor
Winner of State Award of USSR and RF
Oleg A. POVAROV
Director, Doctor o Philosophy (Technical),
Winner of RF State Award
Valery N. SEMIONOV

■ **Main Lines of Research**

Research Supervisor

- **Development of laboratory and natural experimental benches, installations, devices complex and fundamental investigation fulfillment in area of education and multi-phases and multi-component media flows**

Professor Povarov O.A., senior researcher Semionov V.N.

- **Development and equipment creation for the ecologically pure geothermal power plants**

Professor Povarov O.A.

- **Fundamental investigations of multi-component geothermal media flow in power plant equipment**

Professor Povarov O.A., senior researcher Semionov V.N.

- **Investigation of physical-chemical processes of erosion-corrosion in two-phase and multi-component media and metal choice substantiation for the equipment of geo power plant**

Professor Povarov O.A., senior researcher Tomarov G.V.

- **Development and creation of high-efficient steam separator for geo power plant**

Professor Povarov O.A.

- **Development of protection methods for TPP and geoPP equipment against the corrosion. erosion and scales**

Professor Povarov O.A., senior researcher Semionov V.N.

■ **Agreements, contracts, projects supported by the state budget**

- Technological solution development on the heat-mechanical equipment of fourth power unit of Verkhne-Mutnovsk GEO-PP
- Development of arranging solutions on the combined power unit of Verkhne-Mutnovsk GEO-PP
- Geothermal deposit characteristics investigations in Krasnodar region and development the recommendations on its usage in geothermal energy supplying systems
- Development of technical recommendations for Sredneursk PP
- Scientific and engineering support of technical documentation preparation for geothermal heat supply of Rozovyi village
- Technical proposals development on geothermal power installation on low-boiling working medium

■ Key publications

- *Povarov O.A., Nikol'skiy A.I.* Experience of creation and operation of geothermal power plants under conditions of cold climate // *Novoe in rossi'skoy elektroenergetike*. 2005. No 9. P. 15–26.
- *Semionov V.N., Tomarov G.V.* Problems of geothermal heat carrier on GeoPP // *Novoe in rossi'skoy elektroenergetike*. 2005. No 9. P. 27–36.
- *Povarov K.O.* Admixtures and gases distribution between the steam and water phases of geothermal heat carrier // *Novoe in rossi'skoy elektroenergetike*. 2005. No 9. P. 37–47.
- *Povarov O.A., Boyarskiy M.Yu., Nikol'skiy A.I., Shipkov A.A.* Comparative effectiveness of the geothermal power units thermal-dynamical cycles // *Novoe in rossi'skoy elektroenergetike*. 2005. No 9. P. 48–57.
- *Povarov O.A., Tomarov G.V., Semionov V.N., Nikol'skiy A.I.* Fundamental investigations in area of geothermal power engineering // *Teploenergetika*. 2005. No 1. P. 54–63.
- *Povarov O.A., Semionov V.N., Tomarov G.V.* Problems of geothermal heat-carrier in power engineering // *Proc. of geothermal congress. Antalia. Turkey*. 2005.
- *Petrova T.I., Furunzhieva A.V.* Polyamines influence on the carbon steel and brass corrosion in the water // *Proc. of Intern. conf. «Interaction of organic compounds with the water, steam and materials»*. Stuttgart, Germany, 2005.
- *Semionov V.N.* Admixture behavior investigation of the multi-component heat-carrier in the geothermal power plant section // *Teploenergetika*. 2006. No 3. P. 17–22.

■ Dissertations

- *Povarov K.O.* Formation and flow of multi-component heat-carrier in GeoPP: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- RAO «EES Rossii», Moscow
- Energy conservation and new technologies center of Krasnodar region, Krasnodar city
- S.S. Kutateladze Institute of thermal physics, SB of Russian Academy of Sciences, Novosibirsk
- «Geotherm-M» company, Moscow
- «Nauka» company, Moscow

■ Unique equipment

- Large-scale experimental units (steam turbines, separators, heat exchangers) exceeding the best world models
- Field experimental stands for studying processes of erosion-corrosion deterioration of construction metals in GeoPP working environments
- Laser testers for measuring size of moisture drops and sensors for determining characteristics of liquid skins
- Special instruments, tools and measurement systems with which the experimental plants and field stands are equipped and systems of experiment automated control having no world analogues

INSTITUTE OF THERMAL POWER ENGINEERING AND TECHNICAL PHYSICS (ITPETP)

Institute Director

Institute Director
Doctor of Technical Sciences, professor
Aleksander T. KOMOV
Mvictor V. MAKHROV
Ph.: (495) 362-7205
Ph./Fax: (495) 362-7291; (495) 673-3481
E-mail: ITTFDIR-all@mpei.ru

Institute departments

- **Water and Fuel Technology department (WFT)**
- **Thermal Power Stations department (TPS)**
- **Automated Control System for Thermal Processes department (ACSTP)**
- **Vukalovitch Thermal Engineering Fundamentals department (VTEF)**
- **Boiler Plants and Power Engineering Ecology department (BPPEE)**
- **Nuclear Power Stations department (NPS)**
- **Engineering Thermophysics department (ETP)**
- **General Physics and Nuclear Fusion department (GPNF)**

At WFT department:

13 teachers,

20 researchers,

9 engineers and technics,

11 Ph.D.-students.

Head of department Doctor
of technical sciences, professor,
Winner of RF President
and RF Government Award,
Victor N. VORONOV

■ **Main Lines of Research**

Research Supervisor

□ **Water-chemical regimes on TPP and NPP**

Professor Petrova T.I.

□ **Water preparation on TPP and high-mineralized foul water processing**

Senior Researcher Vasina L.G.

□ **Mathematical modeling of the chemical-technological processes**

Professor Voronov V.N.

□ **Computer software complexes development for personnel training and qualification raising for the enterprises exploiting the heat grids, TPP and NPP**

Associated-Professor Ochkov V.F.

□ **Development of academic-methodical complexes in the «Thermal Power Engineering» direction**

Associated-Professor Ochkov V.F.

□ **Monitoring and automatic chemical control systems in TPP and NPP**

Ph.D. Smetanin D.S.

□ **Fuel and technological problems**

Associated-Professor Bugrov V.P.

■ **Agreements, contracts, projects supported by the state budget**

□ Temperature influence investigations on admixture behavior in conformity with TPP operation conditions in helamine presence

□ Helamine influence investigations on the steel corrosion in liquid films in steam turbines phase transition zone

□ Experimental investigation of alloyed steel corrosion speed in the water at temperatures 300...350 °C

□ Phosphate distribution checking in water-steam section of HEPP-22 TP-87 boiler with purpose of its dispensing improvement

□ Analytical review of publication information concerning the admixtures behavior in the reactor installation sections

□ Sulphate mass transfer factors studying between the boiling water and the saturated steam with purpose of mathematical model creation of sulphates distribution in two-phase zone

□ Technological algorithms development for the informational support in systems of water-chemical regimes monitoring and control in TPP

- Regulation development for pollutant solution treatment for the water-chemical regime fulfillment of system of monitoring and control testing in NPP second contour with WW-ER at B-3 bench
- Development of materials for the chemical-technological monitoring system design
- Development and optimization of water-chemical regimes of the evaporator installations
- Simulator development for TPP water-chemical regime control for once-through boilers
- PC software development for the initial data acquisition and analysis on the working place of the chemical department chief.
- Calculation software development for the thermophysical properties of the air-water-water steam-ice system under high pressure and temperature with account of the real component properties

■ Key publications

- *Tokareva T.Z., Ivanova G.M., Smetanin D.S.* Automated chemical monitoring of heat-carrier and solutions in Mosenergo HEPP // *Energoberezhnie*. 2006. No 4. P. 18–24.
- *The effect of* Temperature on the Contamination of Condensate with Organic Impurities / T.I. Petrova, V.I. Rashinsky, V.A. Rogovoy et. al. // *Power plant chemistry*. 2006. Vol. 8. No 7. P. 421–424.
- *Alexandrov A.A., Ochkov V.F., Orlov K.A.* Equations and calculation programs for the gases and burning products properties calculations // *Teploenergetika*. 2005. No 3. P. 48–55.
- *Ochkov V.F.* Heat engineering reference in Internet // *Novoe v rossi'skoy energetike*. 2005. No 3. P. 48–54.
- *Boglovskiy A.V., Gorbunov A.V.* Recommendations on scale formation and corrosion inhibitors application at technological processes of water treatment for the feed steam boilers, water-heat boilers infeed, heat grids in the communal heat-supply systems. Approved by Russian Gosstroj. 2005. P. 26–27; 29; 33; 38.
- *Gorbunov A.V., Serov V.E., Kutianin M.O.* Chemical cleaning technology for water-heating boilers // *Novoe v rossi'skoy electroenergetike*. 2005. No 8. P. 34–37.
- *Petin V.S., Vasina L.G., Boglovskiy A.V., Moshkarin A.V.* Desalted water treatment on the thermal desalt complexes «ECOTECH» // *Energoberezhnie i vodopodgotovka*. 2005. No 4. P. 30–34.
- *Kopylov A.S., Ochkov V.F., Orlov K.A.* Software for perfection and estimation professional skills of chemical department personnel / *Energoberezhnie i vodopodgotovka*. 2006. No1. P. 19–22.
- *Ochkov V.F.* Magnetic water treatment: history and current status // *Energoberezhnie i vodopodgotovka*. 2006. No 2. P. 47–49.
- *Ochkov V.F., Gribin V.G.* Corporative atlas of the power engineering equipment: problems and solutions // *Novoe v rossi'skoy energetike*. 2006. No 2. P. 42–49.
- *Water-chemical* regimes and organic admixture influence on the alloyed steel corrosion speed in the water / T.I. Petrova, V.I. Kashinskiy, V.V. Mokrushin etc. // *Novoe v rossi'skoy electroenergetike*. 2005. No 3. P. 16–22.
- *Stability* of octadecylamin protective films on the equipment surface and its influence on the admixture distribution in deposit layer / E.V. Chernyshov., I.N. Trofimov, T.I. Petrove etc. // *Novoe v rossi'skoy electroenergetike*. 2005. No 6. P. 32–38.
- *Ounsuvd B., Petrova T.I.* Water-treatment installation operation influence on the feed-water and steam quality on UlaanBaatar HEPP-3 // *Energoberezhnie i vodopodgotovka*. 2005. No 4. P. 24–25.

- *Voronov V.N., Petrova T.I., Nazarenko P.N.* Mathematical models and its application in chemical-technological systems for electric stations monitoring // *Teploenergetika*. 2005. No 4. P. 51–54.
- *Voronov V.N., Gashenko V.A., Galimova L.A., Sergeev S.V.* About bench testing of ion-exchange materials // *Novoe v rossi'skoy electroenergetike*. 2005. No 3. P. 11–15.
- *Voronov V.N., Nazarenko P.N., Endrukhnina O.V.* Exploitation experience of chemical-technological monitoring systems on Cherepets HEPP // *Novoe v rossi'skoy electroenergetike*. 2005. No 7. P. 25–31.
- *Belosel'skiy B.S.* Multifunctional action addition application to the furnace masout burned at the electric plants // *Novoe v rossi'skoy electroenergetike*. 2005. No 10. P. 20–25.
- *Exploitation* experience of reversed-osmosis installations for water desalting in TPP and in industrial boiler-houses / A.A. Askernia, I.A. Malakhov, V.M. Korabel'nikov etc. // *Teploenergetika*. 2005. No 7. P. 17–25.
- *Countercurrent* technology UPCORE implementation for chemical desalting on Novgorod HEPP / I.A. Malakhov, V.I. Sosinovich, A.F. Golub etc. // *Energoberezhenie i vodopodgotovka*. 2005. No 4. P. 3–5.
- *Voronov V.N., Sedlov A.S.* Ecological safety of Russian fuel and energy complex // *Proc. of Intern.Conf. «Ecology in power engineering—2005»*. Moscow, 2005. P. 42–48.
- *Development* of monitoring and control system for water-chemical regimes of I and II contours of NPP with WWER-1000 / V.N. Voronov, V.A. Gashenko, A.R. Prelovskiy etc. // *Proc. of Intern. Sympos. «Water-chemical regime of NPP»*, Moscow, 2005. P. 387–395.
- *Voronov V.N., Anikeev V.A., Sedlov A.S.* Ecological safety of Russian fuel and energy complex // *Novoe v rossi'skoy electroenergetike*. 2005. No 12. P. 12–16.
- *Voronov V.N., Scherbatiuk O.S., Ivanov A.A., Pavlov K.V.* Economical substantiation of chemical-technological monitoring system implementation on Dzerzhinskaya HEPP / *Novoe v rossi'skoy electroenergetike*. 2006. No 7. P. 16–21.
- *Voronov V.N., Endrukhnina O.V., Nazarenko P.N.* Application efficiency analysis of chemical-technological monitoring system on the example of Cherepets HEPP // *Teploenergetika*. 2006. No 8. P. 51–58.
- *Voronov V.N., Larin B.M., Senina V.A.* Chemical-technological regimes of NPP with the water-water power reactor: school-book for the universities. MPEI Publishing House, 2006. 390 p.

■ Dissertations

- *Smetanin D.S.* Development and implementation of technological algorithms in the chemical-technological monitoring systems for water-chemical regimes of TPP: Cand. Sci. (Techn.) Dissertation. 2005.
- *Batcukh Oucunbad.* Research and development of actions on the water-chemical regime organization and the water-treatment installation on UlaanBaatar HEPP-2 with bent-tube boiler: Cand. Sci. (Techn.) Dissertation. 2006.
- *Ochkov V.F.* Perfection of design and exploitation of the power plant equipment using the information technologies: Dr. Sci. (Techn.) Dissertation. 2006.

■ Partners

- «Mosenergo» company, Moscow
- JSC All-Russia Research Institute of Nuclear Power Engineering (VNIAM), Moscow
- JSC All-Russia Thermal Engineering Institute (VTI), Moscow

- Electric Power Research Institute (EPRI), Palo-Alto, USA
- Oak Ridge National Laboratory, Oak Ridge, TN, USA
- JSC Kaluga Turbine Works (KTZ), Kaluga
- Russian Scientific Centre "The Kurchatov Institute", Moscow
- JSC Enterprise for Power Plants Maintenance (ORGRES), Moscow
- Co-generation power plants TEC-21, 22, 23, 25, 28, GRES-4 JSC "Mosenergo", Moscow
- Aleksin Co-generation Power Plant JSC "Tulenergo", Aleksin
- Pervomaiskaya Co-generation Power Plant JSC "Tulenergo", Pervomaisk
- JSC "Tverjnergo", Tver'
- Central Boiler-Turbine Institute (TsKTI), St.-Petersburg
- State Unitary Enterprise All-Russia Institute for Nuclear Plant Research (VNIIAES), Moscow
- State Unitary Enterprise "Karpov's Physical-Technical Institute" (GUP NIFTI), Moscow
- Federal State Unitary Enterprise "Dolezhal's Electro-Technical Research and Construction Institute" (FGUP NIKIET), Moscow
- Elektrogorsk Research Centre on Nuclear Plants Safety (ENITs), Elektrogorsk, Moscow region
- R&D Center «Element», Moscow
- Sverdlovsk R&D institute of chemical machinery, Sverdlovsk
- «TRIERU» company, Moscow

■ **Unique Equipment**

- Analyzers for determination of micro concentrations of water impurities:
- Ion-chromatograph (Dionex, USA)
- Atomic-absorbtion spectrometer (AAS-2, Germany)
- Sodium analyzer (Orion, USA)
- Test rig for studies on corrosion rate, impurities behavior in water and steam at operating parameters of power generating equipment
- Cycle chemistry monitoring system
- Test rig for studies on deposits formation
- Network calculation server with MathCad Application Server technology

At TPS department:
19 teachers,
14 researchers,
14 Ph.D.-students.

Head of department
Doctor technical sciences, professor,
Winner of RF Government Award
Anatoliy S. SEDLOV

■ **Main Lines of Research**

Research Supervisor

- **Low-wasted technologies of water-treatment and foul-water processing on the basis of the thermal chemical desalting method**
Professor Sedlov A.S.
- **Schemes and equipment development for the thermal water treatment**
Professor Sedlov A.S.
- **Development of resource and energy saving technologies on TPP**
Professor Sedlov A.S.
- **Development and optimization of schemes and parameters of gas turbine and combined TPP**
Associated-Professor Burov V.D.
- **Investigation of investment economical efficiency at TPP development**
Associated-Professor Burov V.D.
- **Investigation of gas-piston installation application in power engineering**
Associated-Professor Burov V.D.
- **Combine project expertise of gas-turbine, gas-piston and combined TPP**
Associated-Professor Burov V.D.
- **Optimization of TPP operating regimes**
Associated-Professor Il'in E.T.
- **Development of automated monitoring method of the operating condition of TPP equipment**
Associated-Professor Dorokhov E.V.

■ **Agreements, contracts, projects supported by the state budget**

- Development and implementation of the utilization technology for the foul-water of the water treatment installation of Kazan HEPP-3
- Development of the action plan and commercial offer on the decreasing the time of agreed disposal of Mosenergo TPP hydraulic ash removal system expulsion till the maximum permissible level
- Operation efficiency analysis on the various refrigerating media
- Investigation, development and optimization of evaporating equipment for water-treatment on TPP and energy technological complexes
- Hydrodynamics and heat exchange investigations at water solution boiling
- Utilization process investigation for bleed waters of the evaporators on the water-treatment installations of thermal power plants
- Operation efficiency increase for the technological scheme of 250 MW units on HEPP-23 of Mosenergo
- Development and calculation of the individual specific rate of contaminant disposal for Mosenergo TPP

- Development of actions for decreasing the temporary agreed disposals of zinc and copper compounds till the maximum permissible disposals in bleed waters of Mosenergo TPP cooling systems
- Technical-economical analysis of schemes of manufacture the makeup water of the heat grid for TPP «MOEK»
- Ecology audit of OGK-3 and Kostromskaya TPP branch.
- Project expertise for GTU-HEPP in Alexandrov town
- Project expertise for GTU-HEPP in Ekaterinburg town
- Enlarged parameters estimation of the TPP power substitution cost using GTU and combined units
- Balance and parameters calculations for the heat scheme efficiency of the steam-gas unit of Strogino TPP
- Calculation of the heat schemes variants for steam-gas TPP on the basis of the GTU-16PER
- Main resources calculation and efficiency estimation on the construction investments for Dvurechensk gas-turbine TPP
- Draft expertise for power units of «Uralkaliy» ore management (Berezniki town)
- Investigation of application efficiency of aviation gas turbine units in power engineering
- Heat scheme development for steam-gas HEPP for Kotel'niki town of Moscow region
- Investigations and optimization of steam unit thermal scheme for the conditions of OGK-3 branch «Yuzhnouralsk HEPP»

■ Key publications

- *Experience* of low-wasted water consumption systems on TPP / V.V. Shischenko, A.S. Sedlov, I.P. Il'ina etc. // Teploenergetika. 2005. No 4. P. 35–38.
- *Choice* of the optimal water consumption method for thermal power plants / A.S. Sedlov, V.V. Shischenko, B.S. Fedoseev, E.N. Potapkina // Teploenergetika. 2005. No 4. P. 54–60.
- *Heat* transfer factor calculation for the boiling type evaporator in practice / A.S. Sedlov, Yu.A. Kuzma-Kichta, A.C. Kartsev etc. // Elektricheskie stantsii. 2005. No 4. P. 4–9.
- *Komov A.A., Sedlov A.S.* Economical efficiency investigation for combined evaporator installation application // Teploenergetika. 2005. No 7. P. 63–69.
- *Possibility* extension of the express-testing results analysis for the technical state monitoring of turbine installation PT-65/75-130/13 / A.S. Sedlov, E.V. Dorokhov, S.I. Kozlov, I.V. Golubkova // Promyshlennaya energetika. 2005. No 7. P. 16–20.
- *Sedlov A.S., Potapkina E.Y., Komov A.A.* Technical-economical comparison of the water treatment methods for the make-up water of power boilers // Energoberezhenie i vodopodgotovka. 2005. No 5. P. 15–20.
- *Sedlov A.S., Rozhnatovskiy V.D., Komov A.A.* Technical-economical efficiency of evaporator installations with mechanical steam compressors // Promyshlennaya energetika. 2006. No 2. P. 33–42.
- *Burov V.D., Sokolova M.A., Tsanev S.V.* Electrical load regulation of powdered-coal combined unit at under-critical steam parameters // Izvestia RAS. Energetika. No 1. 2005. P. 152–157.
- *Technological* schemes and efficiency indexes of combined unit with steam injection into gas path / O.N. Favorskiy, S.V. Tsanev, V.D. Burov, D.V. Kartashov // Teploenergetika. 2005. No 4. P. 28–36.

- *Burov V.D., Tsanev S.V., Kartashov D.V.* Technical solutions on electrical load regulation of single-line gas turbine units. Russian and foreign experience // *Electrichestkie stantsii*. 2005. No 4. P. 9–13.
- *Tsanev S.V., Burov V.D., Devianin A.V.* Technical re-equipment of steam-power heat-and-power plant into heat extraction steam-gas installation // *MPEI Vestnik*. 2005. No 2. P. 29–33.
- *Increasing* of TPP efficiency, reliability and ecological safety // Proc. of conf. / Under edition of Sedlov A.S., Burov V.D. MPEI Publishing House, 2005. 212 p.
- *Sedlov A.S., Tsanev S.V., Fedorovich L.A.* 75 anniversary of Department of Thermal Power Stations // *Electrichestkie stantsii*. 2005. No 4. P. 4–9.
- *Optimal* loading condition choice for thermalclamping aggregates providing the heat load at non-heating and intermediate periods / M.Yu. Bogachko, E.T. Il'in, Yu.N. Pechonkin, Yu.N. Timofeeva // *Teploenergetika*. 2005. No 5. P. 53–56.
- *Thermal* power stations: textbook for the universities / V.D. Burov, E.V. Dorokhov, D.P. Elizarov etc. MPEI Publishing House, 2005. 454 p.
- *Tsanev S.V., Burov V.D., Remezov A.N.* Gas-turbine and combined units of thermal power plants. — 2nd edition: MPEI Publishing House, 2006. 584 p.
- *Burov V.D., Sigidov Ya.Yu.* Analysis and optimization of thermal scheme structure and parameters of condensation gas turbine units with three pressure exhaust-heat boilers // *Energoberezhenie i vodopodgotovka*. 2006. No 1. P. 31–36.
- *Burov V.D., Zakharenkov E.A.* Effective small power engineering: fuel cells // *Tubniny i dizeli*. 2006. No 4. P. 40–43.

■ Patents

- *Patent 2251002 RF.* Operation method of combined evaporator installation / A.S. Sedlov, A.A. Moshkarin, V.S. Petin. 2005.
- *Authors* certificate 2005610414 on official registration of computer software. Calculation of multistage evaporator installations / A.S. Sedlov, A.S. Kartsev, I.K. Degtiapiov. 2005.
- *Authors* certificate 2005610639 on official registration of computer software. Calculation of steam-gas unit with exhaust-heat boiler / V.D. Burov, Ya.Yu. Sigidov. 2005.
- *Patent 55932 RF.* Evaporators for combined power unit / A.S. Sedlov, A.A. Komov. 2006.
- *Patent 58613 RF.* Combined steam-gas installation with parallel operation scheme. / V.D. Burov, D.V. Kartashov, A.U. Lipets, S.V. Tsanev. 2006.

■ Dissertations

- *Khasiakhmetova D.R.* Development and investigation of technology for softening and partial desalting of wasted water using carboxyl cations: Cand. Sci. (Techn.) Dissertation. 2005.
- *Shtyk O.A.* Development and investigations of the combined units thermal schemes using the heat from garbage-disposal plants: Cand. Sci. (Techn.) Dissertation. 2005.
- *Sapozhnikov M.B.* Development and investigation of electrical station elements of module type using low-boiling working medium: Cand. Sci. (Techn.) Dissertation. 2005.
- *Komov A.A.* Investigation, development and optimization of promising evaporating complexes for water treatment and processing of waster waters: Cand. Sci. (Techn.) Dissertation. 2006.
- *Ivanov A.N.* Perfection of fire fighting systems for masout reservoirs on acting TPP: Cand. Sci. (Techn.) Dissertation. 2006.

- *Sigidov Ya.Yu.* Optimization of structure and parameters of the thermal schemes of condensation steam-gas units with three pressure exhausted-boilers: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- PC «MOSENERGO», Moscow
- Mosenergoproekt Design Institute, Moscow
- Moscow United Energy Company, Moscow
- CHPP-8, 22 of «MOSENERGO», Moscow
- RAO «UES of Russia», Moscow
- Third Generation Company of Whole Market of Electrical Energy, Moscow
- Stuttgart University, Germany
- Mordovsk Generating Company, Saransk
- Generating Company No6, N.Novgorod
- LLC «Siemens», Moscow
- CC «MR-Energo-Stroi», Moscow
- PC «Vserossiyskiy teplotekhnicheskiy institut» (VTI), Moscow
- Berlin Technical University, Germany
- EMK Engineering Company, Moscow
- Joint Institute of high temperatures RAS, Moscow
- PC TKZ «Krasnyi kotel'schik», Taganrog
- PC «Firma ORGRES», Moscow
- Institute Teploelektroproekt, Moscow
- «Quarz» engineering company, Moscow
- «KO-invest» company, Moscow

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6 researcher,

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Head of department

Doctor of Technical Sciences,

Senior Researcher

Alexander V. ANDRYUSHIN

■ Main Lines of Research

Research Supervisor

- **Development of energy strategies for the nearest and medium-term trends**
Senior Researcher Andryushin A.V., professor Kudriavy V.V.
- **Development of technical re-equipment programs for power plants**
Senior Researcher Andryushin A.V., professor Kudriavy V.V.
- **Development of creation and modernization conception for integrated ACS of power plants on the basis of the modern technical means**
Professors Arakelyan E.K., Pan'ko M.A.
- **Development of the control system theory for thermal power engineering and technological objects control**
Professor Rotach V.Ya., Associated-Professor Volgin V.V.
- **Investigation, calculation and metrological feature perfection methods for the primary transducers of complex structure used in power engineering**
Associated-Professor Ivanova G.M.
- **Development of operation monitoring technological tasks, technical diagnostic of the main and auxiliary equipment, ACSHP tasks for power plants, which are included at the stage of ACS creation and modernization on the basis of the modern technical means**
Professor Arakelyan E.K., Associated-Professor Mukhin V.S.
- **Operation regimes optimization of the main and auxiliary equipment of power plants**
Professor Arakelyan E.K., senior researcher Makarchian V.A.
- **Development of fundamentals of the modern computer simulators for the operative personnel of power plants**
Professor Arakelyan E.K., Associated-Professor Zver'kov V.P.
- **Control systems synthesis on the basis of the microprocessor regulators allowing providing the complex regulation laws**
Professor Rotach V.Ya., Associated-Professor Kuzischin V.F.
- **Development of the universal software for efficiency estimation calculation of power boilers operation on the fuel mixtures**
Associated-Professors Sabanin V.R., Smirnov N.I.
- **Optimization problem solutions in power engineering under conditions of the initial information uncertainty and inadequacy**
Professor Arakelyan E.K., Associated-Professor Mezin S.V.
- **Arrangement and optimization of repair control on the power plant and in power system**
Professor Kudriavy V.V., senior researcher Andryushin A.V.

- **Diagnostics of ACSHP informational sub-systems using the artificial intellect technologies**

Associated-Professors Sabanin V.R., Smirnov N.I.

■ **Agreements, contracts, projects supported by the state budget**

- Development of network computer simulator for HPP operating personnel training
- Development of operative technique for electrical load distribution between power units
- Technique perfection for heat expenses measurement for the hot water with the steam for wide consumer range
- Algorithms development and software realization for the initial information reliability monitoring at ACSHP of HPP and NPP
- Development of the multicriterion optimization problem solution methods in power engineering

■ **Key publications**

- *Ivanova G.M., Kuznetsov N.D., Chistiakov V.S.* Heat engineering measurements and instruments: textbook for universities. — 2nd edition, revised and added. MPEI Publishing House, 2005. 460 p.
- *Pletniov G.P.* Automation of technological processes and manufacture in thermal power engineering: textbook for universities. — 3rd edition, revised and added. MPEI Publishing House, 2005. 352 p.
- *Zhuk T.N., Pikina G.A.* Calculation peculiarities of the counterflow heat exchanger frequency responses // *Teploenergetika*. 2005. No 10. P. 73—77.
- *Repin A.I., Sabanin V.R., Smirnov N.I., Andreev S.N.* Diagnostics of informational ACSHP subsystems using the artificial intellect technologies // *Teploenergetika*. 2006. No 6. P. 63—68.
- *Pletniov G.P., Poliakov A.N.* Operative workload determination for the operative personnel of the heat power plant's power units. // *MPEI Vestnik*. 2005. No 1. P. 28—31.
- *Sarkisyan R.E., Arakelyan E.K., Mezin S.V.* Analytical tools for the strategic solution substantiation concerning the Moscow region energy system development // *MPEI Vestnik*. 2006. No 1. P. 14—21.
- *Ivanova G.M., Yachina S.P.* Operation regime influence of the heat-main on the heat registration error // *Teploenergetika*. 2005. No 11. P. 75—78.
- *Rotach V.Ya., Vishniakova Yu.N.* Technological process control systems with the model of object state // *Teploenergetika*. 2005. No 10. P. 42—47.
- *Arakelyan E.K., Pan'ko M.A., Makapchyan V.A., Tsybin A.V.* Automation discharge problems of T-250 power units in sliding steam pressure mode // *Teploenergetika*. 2005. No 10. P. 55—60.
- *Andryushin A.V., Polushkina E.N., Shnyrov E.Yu.* Strategy of energy repairing company development under the condition of competitive market // *Teploenergetika*. 2006. No 10. P. 2—6.
- *Arakelyan E.K., Minasyan S.A., Agababyan G.E.* Multicriterion optimization fundamentals of daily operation modes of HPP power equipment // *Teploenergetika*. 2006. No 10. P. 7—10.
- *Golikov E.V., Pan'ko M.A., Ivanova G.M.* Technological monitoring systems at HPP Mosenergo. Status and development trends // *Teploenergetika*. 2006. No 10. P. 11—12.
- *Automated* system for gas registration at HPP-26 of Mosenergo / A.V. Zakharenkov, V.N. Degteriov, V.V. Usanov etc. // *Teploenergetika*. 2006. No 10. P. 13—16.

- *Rotach V.Ya.* Calculation of automatic control system parameters at its high operating accuracy // *Teploenergetika*. 2006. No 10. P. 17–19.
- *Pan'ko M.A.* Mathematical model choice for control object by experimental data // *Teploenergetika*. 2006. No 10. P. 20–23.
- *Zver'kov V.P., Kuzischin V.F.* Iterative algorithms for dynamical regulator adjustment at random perturbation presence // *Teploenergetika*. 2006. No 10. P. 24–28.
- *Smirnov N.I., Sabanin V.R., Repin A.I., Bochkariova E.Yu.* Three-contour control system adjustment for the steam temperature by evolution modeling method // *Teploenergetika*. 2006. No 10. P. 36–41.
- *Pikina G.A., Kocharovskiy D.N.* Investigation of the system with forecasting algorithm of the maximal operation speed // *Teploenergetika*. 2006. No 10. P. 49–52.
- *Arakelyan E.K., Kozhevnikov N.N., Kuznetsov A.M.* Tariffs on electric energy and heat from HPP // *Teploenergetika*. 2006. No 11. P. 60–64.
- *Tverskoy Yu.S., Arakelyan E.K., Kuznetsov S.I.* Training and refreshing of experts in area of modern ACSHP of power plants // *Teploenergetika*. 2006. No 11. P. 65–69.

■ Dissertations

- *Tsyplin A.V.* Optimal parameters choice and sliding pressure regime automation for powerful energy units: Cand. Sci. (Techn.) Dissertation. 2005.
- *Rozhkov V.N.* Methods for increasing the technological process control effectiveness of the regional thermal power plants: Cand. Sci. (Techn.) Dissertation. 2005.
- *Tarasov D.V.* Interaction optimization of automation subsystems of thermal power objects: Cand. Sci. (Techn.) Dissertation. 2005.
- *Repin A.I.* Information subsystem diagnostic for HPP ACSHP using the artificial intellect technologies: Cand. Sci. (Techn.) Dissertation. 2006.
- *Zhuk T.I.* Development and analysis of the distributed mathematical models of heat processes by multi-dimensional scanning method: Cand. Sci. (Techn.) Dissertation. 2006.
- *Vishniakova Yu.N.* Optimization of multi-contour automatic control systems of the thermal processes by multi-dimensional scanning method: Cand. Sci. (Techn.) Dissertation. 2006.
- *Shnyrov E.Yu.* Perfection of repair service system for the power equipment under the conditions of competitive electric energy markets and repair service: Cand. Sci. (Techn.) Dissertation. 2006.
- *Bui Hai Shon.* Parametrical synthesis and analysis ACS with PID-algorithm of various structure: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- GASPROM company, Moscow
- PROGRAM company, Moscow
- RAO EES Rossii (Unified Power System of Russia) company, Moscow
- Mosenergo company, Moscow
- Research and Production Association NPTeplopribor, Moscow
- MZTA Company, Moscow
- Central Research Institute for Comprehensive Automation (TsNIIKA), Moscow
- Power Engineering Institute n. G.M.Krijjanovski (ENIN)
- Elektrogorsk Research Center for Safety of Nuclear Power Stations (ENITs VNII AES),
- Elektrogorsk, Moscow region

- ❑ Institute of Technical Processes, Automation, and Process Measurements of the Applied Sciences University, Zittau, Germany
- ❑ SIEMENS company, Germany
- ❑ North-Chinese Electrical Power Engineering Institute, China
- ❑ National University of Cheju, Republic of Korea
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23 teachers,
6 researcher,
7 Ph.D. students.

Head of department
Doctor of Philosophy (technical)
Senior researcher Andrey A. SUKHIKH

■ Main Lines of Research

Research Supervisor

- **Combined investigations of the thermal physical properties of ozone-safe working medium of new generation heat-pumps and refrigerating installation**

Professor Alexandrov A.A., Associated-Professor Utionkov V.F.,
Senior researcher Sukhikh A.A.

- **Investigation of thermal physical properties of water, water steam and water solutions for thermal power engineering**

Professor Alexandrov A.A.

- **Investigations and characteristic optimization of heat-power installations by exergy and entropic methods**

Associated-Professor Filatov N.Ya.

- **Combined investigations of physical properties of high-temperature super-conductive materials**

Associated-Professor Filatov N.Ya.

- **Development of high-effective heat-exchange systems**

Associated-Professor Pronin V.A.

- **Convection heat-exchange intensification in elements of power engineering installations**

Associated-Professor Velighko V.I.

- **Development of mathematical and computer models for heat-exchange in two-phase double-component medium**

Professor Solodov A.P., Associated-Professor Ezhov E.V.

- **Thermal dynamic cycles investigations for steam-and-gas units**

Professor Okhotin V.S.

- **Non-traditional energy sources**

Professor Kazandzhan B.I.

- **Numerical modeling of heat-exchange processes in power equipment elements**

Ph.D. Sidenkov D.V.

- **Hydrodynamics and heat-exchange of the swirling flows**

Ph.D. Tokarev Yu.N.

■ Agreements, contracts, projects supported by the state budget

- Determination of PVT-data in vapor phase and at saturation curve of fluorine-ether and its binary mixtures
- Experimental and theoretical investigation of thermal physical properties of the working medium and heat-carriers for thermal power engineering and refrigerating installations
- Development of scientific bases and combined investigation fulfillment for energy efficiency of natural and synthetic refrigeration medium mixture application for the relief heat exchange surfaces in ecologically safe heat-transformers of new generation

- Calculation-theoretical and experimental investigation of the thermal physical properties for the coal-fluoride working medium, heat exchange and thermal dynamic cycles of the promising energy transformation systems
- Calculation-experimental investigations of transition properties and heat exchange in swirling flows of coal-fluoride type substances
- Complex of thermal dynamic properties and heat exchange investigations for ecologically safe substances of coal-fluoride content and development of its application schemes in energy saving heat-pumping and expander-generator systems
- Theoretical and experimental research methods of thermophysical properties of working media, heat carrier and materials
- Fundamental state equations for technically important substances in liquid and gas phases including critical region
- Calculation technique and technical suggestion development concerning the open-type heat exchange in conformity with the steam-and-gas units
- Pilot bench creation for the investigations of heat-transformers and heat-and-mass exchange processes supercritical cycles in the heat-pumping units and installations
- Parameter calculations for pickle solution venting at various gas pumping performance into the underground tank, at various underground tank sizes, various technological hole construction
- Thermophysical property and heat exchange investigations in water-gas system in thermal power installation elements

■ Key publications

- *Dzhuraeva E.V., Alexandrov A.A.* Exergy analysis of processes happening in expander-generator aggregate // *Teploenergetika*. 2005. No 2. P. 73–77.
- *Alexandrov A.A., Ochkov V.F., Orlov K.A.* Equations and program for calculation of the gases properties and burning products // *Teploenergetika*. 2005. No 3. P. 48–55.
- *Alexandrov A.A.* The Equation for Thermophysical Properties of Aqueous Solutions of Sodium Hydroxide // *Water, Steam and Aqueous Solutions for Electric Power. Advanced in Science and Technology*. Maruzen CO, Japan. 2005. P. 86–90.
- *Alexandrov A.A., Orlov K.A., Ochkov V.F.* Mathematical packages – new approaches in studying and calculating of thermodynamical processes. // *Izvestia vuzov. Problemy energetiki*. 2005. No 11–12. P. 80–86.
- *Pronin V.A.* Development of new composition of cross-streamlined tube beams // *MPEI Vestnik*. 2005. No 2. P. 34–42.
- *Pronin V.A., Romanenko A.N., Klevtsov A.V.* Energy efficiency of ribbed tube beam of air water-cooler. // *MPEI Vestnik*. 2005. No 3. P. 36–39.
- *D'iachkov L.G., Kostanovskiy A.V., Kostanovskaya M.E.* Melting thermogram analysis for thin plates of refractory metal during the heating by laser emission with harmonic intensity component // *Pisma v GTF*. 2005. V. 31. No 15. P. 69–75.
- *Kostanovskiy A.V., Zeodinov M.G., Kostanovskaya M.E.* Determination of graphite heat conductivity and emitting capability at high temperatures // *Teplofizika vysokikh temperatur*. 2005. V. 43. No 5. P. 791–793.
- *Transportation and Focusing of Accelerated Protons Beams by Means of Dielectric Channels* / L. Zhilyakov, G. Pokhil, K. Vokhmyanina, A. Kostanovski et al. // *Book of Abstracts of the Intern. Conf. on Strongly Coupled Coulomb Systems, Moscow, 2005*. P. 117.
- *Sukhikh A.A., Zakopyrin M.A., Utionkov V.F.* Experimentally substantiated equation of HFE347mcc state for calculation of heat pump cycles // *Proc. of XI Russian conf. on thermophysical properties of substances. Sankt-Peterburg, 2005*. V. 1. P. 42–43.

- *Filatov N.Ya., Utionkov V.F.* Temperature function of R151 chladone saturation pressure and thermal condition equation // Ibid. P. 44–45.
- *Sukhikh A.A., Zakopyrin M.A.* Experimental investigation of PvTx-surface of SF₆-C3F₈ mixture refrigeration medium // Ibid. P. 163–164.
- *Sychiov V.V.* Some results of the combined investigation of gases and liquids thermophysical properties used in power engineering // Teploenergetika. 2005. No 4. P. 64–67.
- *Sychiov V.V.* Specialization and industrial co-operation experience within the limits of SEV // Proc. of Intern. conf. «United Europe: the past and the present of the economical integration», Moscow, 2005. P. 30.
- *Solodov A.P., Romanenko A.N., Egorova N.V., Ezhov E.V.* Differential heat-exchange model in evaporating cooling tower // MPEI Vestnik. 2005. No 2. P. 43–53.
- *Tokarev Yu.N., Erokhina A.A., Komov A.T.* Numerical investigations of hydrodynamics and heat-exchange in the tube with the helical insertion // Proc. of 2nd Russian conf. «Heat-and-mass transfer and hydrodynamics in swirling flows». Moscow, 2005. P. 57.
- *Tokarev Yu.N., Erokhina A.A., Komov A.T.* Numerical investigation of laminar swirling flows // Problems of gas-dynamics and heat-and-mass transfer in power engineering installations: proc. of XV school-seminar of young scientists and specialists under supervision of academician RAS Leont'ev A.B., Kaluga, 2005. P. 65.
- *Tokarev Yu.N., Erokhina A.A., Komov A.T.* Geometrical factors influence on the formation of the determine swirling structures in reactor collectors with the liquid-metal cooling // Inter-branch subject conf. «Heat-hydraulic aspects of nuclear energy reactor safety with reactors on the fast neutrons». Obninsk. FGUP GNZ Pf-FEI. 2005. P. 37.
- *Okhotin V.S.* Expander-generator aggregates in schemes of condensation and thermal-clamping steam-turbine units with gas heating by the steam for turbine bleeding (thermodynamical analysis) // Novoe v rossi'skoi elektroenergetike. 2005. No 2. P. 23–30.
- *Okhotin V.S., Sergeeva L.V.* Fuel afterburning influence on the efficiency of thermodynamical cycles of steam-gas units with the exhaust-heat boiler // MPEI Vestnik. No 4. 2005. P. 18–25.
- *Zarudko M.A., Sidenkov D.V., Zaitov R.F.* Heat-pump installation application in ma-sout heating system on TPP // Proc. of XI Intern. conf. of students and Ph.D.-students dedicated to 75-anniversary of MPEI. 2005. V. 3. P. 135.
- *Filatov N.Ya., Sokolov E.Yu.* Thermodynamical analysis of steam turbine unit energy indexes at the separate and combined heat and work producing // Proc. of national conf. on thermal power engineering NKTE–2006, Kazan, Russia. 2006. V. 1. P. 52–56.
- *Alexandrov A.A., Kondakova G.Yu., Orlov K.A.* Calculation software for humid air properties under increased pressure // Ibid. P. 65–68.
- *Sukhikh A.A., Zakopyrin M.A., Utionkov V.F.* State equation of Karnachan-Starling-de-Santis for HFE-347mcc ether // Ibid. P. 69–72.
- *Okhotin V.S., Alexandrov A.A.* Thermodynamical properties tables for the refrigeration media. MPEI Publishing House, 2006. 32 p.
- *Okhotin V.S., Alexandrov A.A., Tsarev V.V.* Mathematical modeling of TPP thermodynamical cycles. MPEI Publishing House, 2006. 32 p.
- *Solodov A.P., Ezhov E.V.* Elementary heat-exchange models at condensation. MPEI Publishing House, 2006. 56 p.
- *Sedlov A.S., Solodov A.P., Bukhonov D.Yu.* Condensate production from outgoing flue gas on the experimental installation of GRES-24 // Energoberezhenie i vodopodgotovka. 2006. No 5. P. 76–77.

- *Filatov N.Ya., Sokolov E.Yu.* Thermodynamical analysis of steam-turbine unit energy indexes at separate and combined heat and work production // Novoe v rossi'skoi elektroenergetike. 2006. No 1. P. 41—50.
- *Egorova N.V., Solodov A.P., Romanenko A.N.* Heat-and-mass exchange and hydraulics in evaporating cooler towers // Proc. of IV Russian conf. on heat-and-mass transfer. In 8 vol.: MPEI Publishing House. 2006. V. 5. P. 111—114.
- *Komov A.T., Tokarev Yu.N.* Numerical analysis of swirling flow laminar streams of the incompressible liquid in Cartesian-spiral co-ordinates // Ibid. V. 2. P. 153—155.
- *Solodov A.P.* Computer model of bubble-boiling // Ibid. V. 4. P. 216—219.
- *Combined* investigations of the vortical structure of swirling flows in channels of complex geometry / Yu.M. Tokarev, O.V. Mitrofanova, L.S. Kokorev etc. // Ibid. V. 6. P. 253—257.
- *Komov A.T., Tokarev Yu.N., Erokhina A.M.* Laminar flow mode in tubes with helical band insertion // MPEI Vestnik. 2006. No 1. P. 29—33.

■ Dissertations

- *Dzhuraeva E.V.* Investigation of application schemes of expander-generator aggregates in power engineering and gas supply systems: Cand. Sci. (Techn.) Dissertation. 2005.
- *Egorova N.V.* Heat-and-mass exchange at evaporation and condensation in contact type apparatuses: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- Institute of experimental mineralogy Russian Academy of Science, Chernogolovka-town, Moscow region
- Institute of solid state physics, Russian Academy of Science, Chernogolovka-town, Moscow region
- OAO «Gasprom, Moscow.
- All-Russian scientific—research institute of oil mashine building (VNIINEFTEMash), Moscow
- Kazan State University of Technology, Kazan.
- State academy of refrigeration and food technologies, St.Peterburg.
- All-Russian scientific—research center of standartization, informatization and certification of raw materials, materials and substances, Moscow
- Special Design Bureau VTI, Moscow
- EKIP Company, Moscow
- FGUP R&D Institute of Energy Technologies, Moscow

■ Unique equipment

- Precision experimental installations for investigation of liquid –vapor equilibrium and volume relationship of mixtures of low-boiling substances.
- Precision experimental installations for investigation heat capacity, thermal and electric conductivity high –temperature super-conducting materials.
- Experimental installation «Heat pump TH-300»

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■ **Main Lines of Research**

Research Supervisor

- **Investigation of the aerial basin pollution of the industrial towns and energy complexes by the power engineering enterprise emissions and development of automated data banks for TPP equipment and boiling houses**
Associated-Professor Prokhorov V.B.
- **Development of catalytic TPP at full prevention of nitrogen oxide formation**
Associated-Professor Prokhorov V.B.
- **Development, investigation and implementation of high-efficient technologies for stepped burning of coal, gas and masout on the basis of flame aerodynamic optimization**
Senior researcher Arkhipov A.M.
- **Reliability, efficiency and ecology improvement of ash-slag disposal and dust supply on TPP**
Senior-researcher Putilov V.Ya.
- **Optimization of fuel usage and heat supply**
Associated-Professor Izvekov A.V.
- **Noise reduction from power engineering equipment**
Professor Tupov V.B.
- **Nitrogen oxides emission reduction for the power engineering equipment and firing sterilization of the waste waters**
Professor Kormilitsyn V.I.
- **Ash collecting degree increase in electric separators**
Ph.D. Chernov S.L.
- **Aerodynamic implementation optimization of TPP gas-air channels and operation reliability increase for chimneys**
Associated-Professor Prokhorov V.B., Ph.D. Chernov S.L.
- **Electrodynamical monitoring development for heat-carrier quality and perfection of equipment metal protection technologies against the parking corrosion**
Senior researcher Dubrovskiy-Vinokurov I.Ya.

■ **Agreements, contracts, projects supported by the state budget**

- Development of ecologically pure catalytic electrical station of low power
- Aerodynamical calculation fulfillment of gas channels and chimney and external gas flue parameter choice for PGU-450T unit of Severnaya HEPP and HEPP-21 Mosenergo
- Recommendation development for noise reduction from Mosteploenergo gas boiler-houses

- Noise silencer construction choice for PTVM boiler gas channels for «Babushkino-2», «Vidnoe», Volkhonka-ZIL», KTS-18. Implementation projects development
- Noise silencer construction choice of ventilation equipment and compressor-condensation aggregates «Tushino-1». Implementation projects development
- Recommendation development on steam emission noise reduction on HEPP-9 Mosenergo and noise silencer project co-ordination development
- Working project development of two steam noise silencer for lighting lines of 4th and 5th boilers of the same standard size under conditions of HEPP-9 Mosenergo and its co-ordination project
- Development of innovation actions for noise influence reduction from HEPP-23 to build-up zone
- Acoustical measurement fulfillment during the emergency power supply system reconstruction of office building «AK Transneft»
- Calculation execution for noise silencer efficiency determination for exhaust-heat boiler FT-8.3 and its construction development
- Best noise silencer construction choice of aerial channel of PTVM and KVGM boilers for «Tushino-3», «Khimki-Khovrino», «Novomoskovskaya» and «Nagatino». Implementation project development
- Acoustical measurement fulfillment near the equipment and on outlet cut of chimney KTS-54
- Noise silencer construction choice on the smoke exhausters outlet jets for power 8th and 9th boiler TGMP-314 at HEPP-21 Mosenergo, Implementation project development
- Acoustical measurements in the ambient space of HEPP-23 Mosenergo after noise absorbing screen installation on cooling tower No 2
- Investigation and optimization of stepped Kuznetsk coal burning technology in TP-87 boilers with liquid slag removal at Zapadno-Sibirskaya HEPP
- Recommendations development and regime-adjustment tests execution at BKZ-220 boiler of Kusnetsk HEPP after installation the tertiary blowing nozzles in order to reduce the nitrogen oxides emission
- Nitrogen oxides emission reduction at PK-40-1 boilers of Tom-Usinsk GRES
- Development and implementation of dispersion device for liquid waste waters polluted by mineral oil, for firing sterilization in the steam boiler furnace
- Development and implementation of cavitation device for water-masout emulsion preparation
- TGMP-314C boilers testing on HEPP-23 Mosenergo at water-masout mixture firing

■ Key publications

- *Lipov Yu.M., Treťiakov Yu.M.* Boiler installations and steam generators: textbook for universities. — 2nd edition. RKHD Publisher, Izhevsk, 2005. 550 p.
- *Tupov V.B.* Noise reduction from power engineering equipment: MPEI Publishing House, 2005. 232 p.
- *Galas I.V., Zroichikov N.A., Lyskov M.G.* Experience in NOx emission reduction without decreasing the exploitation characteristics of HEPP-23 Mosenergo boilers // Proc. of II Intern. conf. «Ecology in power engineering—2005». MPEI Publishing House, 2005. P. 91—95.
- *Coppola D., Putilov V.Ya., Putilova I.V., Savastano S.* Application of MAC technology of dry slag removal – possibility of essential increasing of reliability, efficiency and ecological compatibility of coal electrical stations // Ibid. P. 237—242.

- *Ecological* effectiveness, reliability and operation efficiency increase for the «Kuzbasenergo» boilers modernized under Kuznetsk coal stepped burning on the basis of MPEI achievements / V.V. Abramov, A.M. Arkhipov, A.A. Vagner etc.// Ibid. P. 243—245.
- *Biriukov O.V., Lyskov M.G., Prokhorov V.B., Putilova A.V.* Ecological and economical aspects of catalytic thermal station implementation // Ibid. P. 246—249.
- *Arkhipov A.M., Lipov Yu.M., Treťiakov Yu.M.* Technological possibilities extension for the burning product recirculation schemes in the gas-masout boilers // Elektricheskie stantsii. 2005. No 5. P. 30—35.
- *Lyskov M.G., Prokhorov V.B., Biriukov O.V.* Technical and ecological characteristics of Moscow boiler equipment and ways of its perfection // Teploenergetika. 2005. No 5. P. 57—62.
- *Putilov V.Ya., Putilova I.V., Maslov S.I.* Problems of training, qualification increasing, and professional refreshing in area of power engineering ecology for Russian energy enterprises specialists // Proc. of II Intern conf. and special exhibition «Ecology in power engineering—2005». MPEI Publishing House, 2005. P. 28—33.
- *Putilov V.Ya., Putilova I.V.* Promising technologies of slag removal in thermal power plants // Proc. of II Intern/ forum «Power engineering and ecology». RAS Publisher, 2005. P. 24.
- *Chernov S.L.* Effectiveness increasing for the electrical separator operation in thermal power plants // Ibid. P. 28—29.
- *Putilov V.Ya., Putilova I.V.* Main problems of ash-slag utilization at power engineering industry in Russia // Ecologia proizvodstva. Bulletin No 1. Otrasleyve vedomosti Publishing House. 2005. P. 8—13.
- *Priadko B.I., Putilov V.Ya., Biriukova N.V.* Observation of the environment protection requirements at material choice, designing and exploitation of heating conduit // Energonadzor i elektrobezopasnost. 2005. No 4. P. 74—76.
- *Krasnov V.I., Tupov V.B.* Noise level variation from the chimney after water-heating boiler modernization // Teploenergetika. 2005. No 3. P. 62—66.
- *Tupov V.B., Krasnov V.I.* Experience of noise level reduction from air inlet of the boiler blasting fan // Teploenergetika. 2005. No 5. P. 24—27.
- *Tupov V.B.* Environmental Noise From Modernized Hot-Water Boilers in Moscow// The 34 Intern. Cong. and Exposition on Noise Control Engineering, Rio de Janeiro, Brazil, 07—10 August 2005. P.1458—1464.
- *Chernov S.L.* Operation efficiency increase for electrical separators of thermal power plants // Izvestia akademii promyshlennoi ekologii. 2005. No 4. P. 34—40.
- *Ganiev R.F., Kormilitsyn V.I., Rudakov V.P.* Investigation of solid and toxic components collecting efficiency for the gaseous industrial emissions by the gas-dynamic devices operations on the basis of the working liquid emulsification usage in the swirling upward current of the cleaning gas // Proc. of II Russian conf «Heat-and-mass exchange and hydrodynamics in swirling flows. MPEI Publishing House, 2005. P. 185—186.
- *Zroichikov N.A., Galas I.V., Morozova E.A.* Combined reconstruction of TGMP-314C on HEPP-23 Mosenergo for harmful substance emission decrease into environment // Teploenergetika. 2006. No 6. P. 26—30.
- *Tupov V.B.* Noise reduction problems on Russian TPP // Proc. of III Intern conf. and special exhibition «Ecology in power engineering—2006». 2006. C. 65—69.
- *Tupov V.B., Chugunkov D.V.* Steam emission noise silencer // Elektricheskie stantsii. 2006. No 8. P. 44—47.
- *Tupov V.B., Siomin S.A.* Silencer development for noise influence decrease from gas-turbine units with exhaust-heat boiler // Proc. of conf. «Building physics in XXI century» / Under edition of Shubin I.L.: NIISF RAACN Publisher. P. 315—318.

- *Tupov V.B., Chugunkov D.V.* Steam emission noise of thermal power plants. Computer modeling // Ibid. P. 319—322.

■ Patents

- *Patent 51673 RF.* Noise silencer for steam emission (variants) / V.B. Tupov, D.V. Chugunkov // Bl. 2006. № 6.

■ Dissertation

- *Krasnov V.I.* Development of noise reduction methods from gas channels at PTVM water-heating boiler modernization in the ambient region: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- JSC RAO UES of Russia, Moscow
- State Unitary Enterprise «MOSTEPLOENERGO», Moscow
- All-Russia Thermal Engineering Institute, Moscow
- JSC «Institute VNIPIEnergoprom», Moscow
- JSC Institute Teploelektroproekt
- JSC Institute Energosetproekt, Moscow
- JSC «Mosenergo», Moscow
- JSC URALORGRES, Ekaterinburg
- JSC «URALVNIPIENERGOPROM», Ekaterinburg
- JSC «Firm ORGRES»
- JSC ENIN, Moscow

■ Unique equipment

- 2800 Frequency analyzer and 800 B noise-level meter of «Larson&Davidson» Co. and other modern equipment for acoustic measurements

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At NPS department:
17 teachers,
6 researchers,
9 Ph.D.-students.

Head of department,
Doctor of technical sciences
Professor Vladimir N. BLINKOV

■ **Main Lines of Research**

- Research Supervisor
- **Investigation of severe accident process passing on NPP with water-moderated type reactor**
Professor Rassokhin N.G.
 - **Reliability and safety analysis for NPP**
Assoc.-Prof. Kuznetsov V.D.
 - **Working capacity estimation for constructive materials and NPP equipment resource**
Professor Gorbatykh V.P.
 - **Methods and means for NPP technical diagnostic**
Professor Proskuriakov K.N.
 - **Theoretical calculation development for natural circulation, hydraulic characteristics and admixture distribution in NPP steam generating equipment**
Professor Gorburov V.I.
 - **Development of automated modeling and calculation system of NPP technological schemes**
Professor Zorin V.M.
 - **Strategy choice for exploitation removal of nuclear power units spent the target life**
Associated-Professor Skachek M.A.
 - **Internal fuel cycles of water-moderated nuclear reactors**
Associated-Professor Baibakov V.D.

■ **Agreements, contracts, projects supported by the state budget**

- Scientific bases of multi-dimension multi-liquid modeling of thermophysical, physical-chemical and strength processes on NPP with WWER in nominal and accident conditions including out-of-project accidents
- Application of modern informational technologies for reliability and exploitation safety increase at NPP
- Numerical investigations of thermophysical processes under the conditions of planned and out-of-project accident at NPP
- Investigation of dynamical thermophysical damage processes and uncertainty influence estimation on the passing character on NPP with WWER

■ **Key publications**

- *Zorin V.M.* Nuclear electric stations. MPEI Publishing House, 2006. 184 p.
- *Gorburov V.I., Petrov A.Yu., Zhukov A.G.* Gravitational separation in horizontal steam generators of PGV-1000 type for NPP with WWER // Atomnaya energiya. 2005. V. 98. No 6. P. 435—444.

- *Alkhutov M.C., Mikheev I.V.* Determination of economically optimal steel nuclide structure 08X18N10T in active zone of RBMK-1000 reactor // *Teploenergetika*. 2005. No 1. P. 73—76.
- *Tevlin S.A.* Additional problems arising in connection with increasing the country number with nuclear energy // *Bulleten po atomnoi energii*. TSHIATOMINFORM Publisher. October 2005. P. 54—56.
- *Tevlin S.A.* Safety culture importance for the normal exploitation of NPP // *Ibid.* September 2006. P. 18—27.
- *Gorbatykh V.P., Ivanov S.O.* Providing the safe exploitation period prolongation of NPP equipment // *Proc. of V conf. «Ensure NPP safety with WWER»*. Podolsk, 2005. V. 4. P. 91—116.
- *Separation* modeling for micro-emulsion drops in granular layer / V.M. Alipchenkov, A.Yu. Vakhurshin, S.N. Veselov etc. // *MPEI Vestnik*. 2005. No 4. P. 40—47.
- *Proskuriakov K.N., Nikiforov V.N.* Reasons understanding and forecasting of the pressure oscillation increasing for the heat-carrier // *Proc. of Intern. Congress on leading NPP ICAPP-05*, Seoul, Republic of Korea, 2005. P. 762—778.
- *Proskuriakov K.N.* Cracks formation phenomena in reactor heads — randomness or regularity ? // *Proc. of MAGATE symposium «Operative monitoring of equipment and processes condition»*. Knoxville, Tennessee, US, 2005. P. 128—144.
- *Proskuriakov K.N., Sasin V.Ya.* Investigation of thermal hydraulic parameters combination which increase the construction tensions in nuclear reactor caused by heat-carrier flow influence // *Proc. of Space Nuclear Conf. San-Diego, California*. 2005. P. 434—450.
- *Rassokhin N.G., Loktionov V.D., Mukhtarov E.S.* Heat and strength analysis of WWER-440 reactor body at accident with the active zone melting // *Teploenergetika*. 2006. No 9. P. 3—9.
- *Combined* heat-chemical test results of the steam-generator No 2 of power unit No 1 of Volgodonsk NPP / V.I. Gorburov, Yu.F. Kutdiusov, I.F. Bud'ko etc. // *Teploenergetika*. 2006. No 9. P. 10—15.
- *Vorob'iov Yu.B., Kuzhetsov V.D., Mansouri M.* Uncertain factor influence estimation at accident process analysis on NPP with WWER-1000 // *Teploenergetika*. 2006. No 9. P. 16—21.
- *Proskuriakov K.N.* Heat-hydraulic reasons of increasing of dynamical tensions and cracks in cased reactors heads // *Teploenergetika*. 2006. No 9. P. 22—25.
- *Comparison* of influence estimation technique for the non-condensed gases on the steam condensation with account of energy technological processes interaction in the 1st contour of nuclear power unit / O.E. Stepanov, A.V. Bulanov, V.E. Karnaukhov etc. // *Teploenergetika*. 2006. No 9. P. 26—31.
- *Klimenko A.V.* Ecological restrictions of nuclear power engineering competitiveness // *MPEI Vestnik*. 2006. No 5. P. 5—10.
- *Gorbatykh V.P., Ivanov S.O.* Fundamentals of corrosiology // *MPEI Vestnik*. 2006. N 5. P. 11—16.
- *Sidorov A.S., Rassokhin N.G., Khasanov R.Kh.* Device for liquid melt for NPP with WWER-1000 // *MPEI Vestnik*. 2006. No 5. P. 31—42.
- *Vorob'iov Yu.B., Kuznetsov V.D.* Identification of accident situations on NPP and development of optimal control affects // *MPEI Vestnik*. 2006. No 5. P. 17—24.

- *Proskuriakov K.N.* Parametrical excitation of dynamic loads for equipment of water-cooled nuclear reactor // MPEI Vestnik. 2006. No 5. P. 25–30.
- *Loktionov V.D.* Estimation of conditions and damage time of WWER-440 reactor body at the severe accident with active zone melting // MPEI Vestnik. 2006. No 5. P. 43–47.
- *Skachek M.A.* To the lifetime prolongation of carbon-uranium reactors // MPEI Vestnik. 2006. No 5. P. 48–51.
- *Zorin V.M., Mil'nichenko D.N.* To the position determination of indifferent point inside the turbine // MPEI Vestnik. 2006. No 5. P. 52–62.
- *Baibakov V.D., Zorin V.M.* Technique for parameter optimal value estimation for the NPP heat scheme of steam-gas turbine unit // MPEI Vestnik. 2006. No 5. P. 63–66.
- *Stavchikova I.A., Khudiakov A.M., Bulanov A.V., Vorob'iov Yu.B.* Investigation of salt deposit formation in NPP heat exchangers cooled by the sea water // MPEI Vestnik. 2006. No 5. P. 67–71.
- *Kovalevich O.M.* Optimal expenses determination for providing of nuclear power plant safety // MPEI Vestnik. 2006. No 5. P. 87–93.
- *Kaverznev M.M., Fateev V.V.* Technical-economical efficiency estimation of peak power creation on the basis of NPP-SATE complexes // MPEI Vestnik. 2006. No 5. P. 94–96.

■ Dissertations

- *Djahan Farnia Golam Reza.* Admixture spatial distribution modeling in steam-generating channels of NPP and TPP equipment: Cand. Sci. (Techn.) Dissertation. 2005.
- *Driomin G.I.* Investigation of natural circulation efficiency in 1st reactor contour with WWER-1000 during the accident with low heat-carrier leakage: Cand. Sci. (Techn.) Dissertation. 2005.
- *Petrov A.Yu.* Modernization of separator facility of NPP steam generators for WWER: Cand. Sci. (Techn.) Dissertation. 2005.
- *Dolganov K.S.* Substantiation of carbon-uranium reactor safety at channel drainage: Cand. Sci. (Techn.) Dissertation. 2005.
- *Mansouri Masud.* Analysis of parameter uncertainty at dynamical processes modeling in NPP contours with WWER: Cand. Sci. (Techn.) Dissertation. 2006.
- *Al Kassem Samer.* Periodic chemical cleaning influence for deposits in the NPP with WWER steam generator slots and gaps upon the construction materials lifetime: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Volgodonskaya NPP, Volgodonsk
- Balakovskaya NPP, Balakovo
- Federal state unitary filial enterprise «All-Russia scientific research institute of NPP» (FGUDP VNIIAES), Moscow
- High engineering school, Zittau, Germany
- Kalininskaya NPP, Tver
- Scientific and technical center of Nuclear regulation Commission of Russian Federation (SCNRC of Russian Federation), Moscow
- Experimental designer office "Hydropress" (OKB "Hydropress"). Podolsk, Moscow district.
- The Russian centre of science "Kurchatov institute" (RNC KI), Moscow

- Electrogorsky research center of All-Russia scientific research institute of NPP, Electrogorsk, Moscow district.

■ **Unique Equipment**

- Complex of the measuring and analyzing equipment for the control of vibrations of the corporation "Bruel and Kier"
- Analytical simulator for NPP with WWER-1000
- Under critical uranium — water installation
- Thermal hydraulic-corrosion installation

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At ETP department:
24 teachers,
12 researcher,
10 Ph.D. students.

Head of department,
Doctor of technical sciences,
Professor Valentin G. SVIRIDOV

■ **Main Lines of Research**

Research Supervisor

- **Investigation of turbulence structure**
Professor Sviridov V.G.
- **Laboratory experiment automation. Technology development of automated laboratory practical training with remote computer access**
Professor Sviridov V.G.
- **Hydrodynamic and heat-transfer investigation of liquid metal flow in magnetic field**
Professor Genin L.G.
- **Heat-and mass transfer processes under intensive heat and electric affects**
Professor Sinkevich O.A.
- **Heat-transfer and hydrodynamics in high-intensive processes of liquid-steam phase transitions**
Professor Yagov V.V.
- **Investigations of thermophysical properties of substances in wide range of condition parameters**
Professor Makhrov V.V.
- **Reference data creation on the basis of thermophysical properties of chemically reacting gases. Thermodynamics of non-equilibrium systems**
Professor Semionov A.M.
- **Heat-transfer and hydrodynamics at water solutions boiling. Investigation of heat cooling intensification in single and double phase media**
Professor Kuzma-Kichta Yu.A.
- **Steam and steam-gas mixtures condensation processes investigations on the surfaces with heat-exchange intensifiers**
Associated-Professor Smirnov Yu.B.
- **Development of thermophysical measurement methods, sensors and transducers for experiments**
Senior researcher Miroshnichenko V.I.
- **Investigation of thermophysical properties, technological characteristics, thermodynamic cycles of ozone-safe substances**
Associated-Professor Ustiuzhanin E.E.
- **Development of mathematical models, algorithms, multi-purpose software and numerical modeling of complex heat-and-mass transfer processes**
Senior Researcher Yan'kov G.G.

■ **Agreements, contracts, projects supported by the state budget**

- Investigations on hydrodynamics and heat transfer of liquid metal flow in longitudinal magnetic field

- Experimental and theoretical investigations of turbulent flows affected by mass force fields
- Development of sensors for measurements in the turbulent flows
- Combined influence investigation of magnetic field and thermogravitational convection on hydrodynamic and heat transfer exchange of liquid metals. Support program for unique scientific centers
- Development of experimental research automation systems
- Heat-and-mass transfer processes investigation at intensive heat and electric affects
- Theoretical and experimental investigation of dynamic effects which is preceded and accompanied the boiling crisis
- Heat transfer and boiling crisis mechanisms of subcooled liquid under the conditions of various intensity of mass forces
- Heat emission mechanisms and change conditions for thermohydraulic modes of two-phase flows in micro heat emitted element filling
- Heat transfer mechanisms at steam formation
- Heat transfer and hydrodynamics in high-intensive processes of liquid-steam phase transition
- Computer codes on turbines with various types of heat carrier
- Development of mathematical models, computer codes, investigation of heat-and-mass transfer processes and constructive solution optimization for the reactor of solid-phase hydrogen storage and cleaning
- Development of the scientific basis of parallel calculations using computer code ANES and heat-and-mass transfer process analysis in the various equipment elements including mini- and micro-channels, by the direct computer modeling method
- Scientific-technological base creation for optimization of constructive solutions and operating modes of hydrogen saving and cleaning on the basis of metal-hydrides and new nano-materials
- Development of mathematical model and numerical calculation of natural circulation loop for cooling for the computer elements

■ Key Publications

- *Steam* film behavior on the highly-overheated surface submerged into under-heated water / V.S. Grigoriev, Yu.A. Zeigarnik, V.G. Zhilin etc. // *Teplofizika vysokikh temperatur*. 2005. V. 43. No 1. P. 100–114.
- *Sinkevich O.A., Chikunov S.E.* Generalized Poiseuille profiles in plasma flows on the stabilized plasmatron section // *Teplofizika vysokikh temperatur*. 2005. V. 43. No 2. P. 165–174.
- *Genin L.G., Listratov Y.A., Razuvanov N.G., Sviridov V.G.* Influence of Secondary Vortices of Thermogravitational Convection on Liquid Metal Heat Exchange in a Horizontal Tube in a Magnetic Field / *Journal of Heat transfer Researches*, 2006. V. 37. No 8.
- *Internet* portal of native thermophysics. Resources for teaching and professional activity / G.A. Kobzev, V.V. Yagov, A.O. Erkimbaev etc. // *MPEI Vestnik*. 2005. No 5. P. 34–46.
- *Yagov V.V.* Heat Transfer and Crisis in Swirl Flow Boiling // *Experimental Thermal and Fluid Science*. 2005. Vol. 29. P. 871–883.
- *Franco A., Latrofa E.M., Yagov V.V.* Heat Transfer Enhancement in Pool Boiling of a Refrigerant Fluid with Wire Nets Structures // *Experimental Thermal and Fluid Science*. 2006. Vol. 30. P. 263–275.

- *Yagov V.V., Leksin M.A.* Boiling crisis of under-heated liquid on horizontal cylindrical heaters // *Teploenergetika*. 2006. No 4. P. 15–22.
- *Borzenko V.I., Dunikov D.O., Lazarev D.O.* Investigation of heat-and-mass transfer processes in experimental metal-hydride reactors // Proc. of school-seminar for young scientists under supervising of academician RAS A.I. Leont'iev «Problems of gas-dynamics and heat-and-mass exchange in power engineering installations: MPEI Publishing House, 2005. V. 2. P. 231–234.
- *Main* factors restricted the hydrogen sorption speed in metal-hydride storage systems / V.I. Artiimov, D.O. Lazarev, G.G. Yan'kov etc. // Proc. of Intern. symposium on hydrogen energetic: MPEI Publishing House, 2005. P. 121–126.
- *Theoretical* model and heat-and-mass transfer process calculation results in hydrogen storage and cleaning systems on the basis of micro- and nano-porous accumulating materials with the purpose of reactor construction and its operating mode optimization / V.I. Artiimov, O.V. Borovskikh, D.O. Lazarev etc. // Proc. of Intern. Forum «Hydrogen technologies for energy producing»: ANO «Rusdem— Energoeffekt» Publisher. 2006. P. 109.
- *Artiimov V.I., Borovskikh O.V., Lazarev D.O. Yan'kov G.G.* Numerical modeling of heat-and-mass transfer processes in micro- and nano-structured medium at hydrogen sorption and desorption // Proc. of IV Russian national conf. on heatexchange. In 8 vol.: MPEI Publishing House, 2006. V. 1. P. 149–154.
- *Numerical* and experimental investigation of natural convection in liquid near the heated cylinder / V.I. Artiimov, G.G. Yan'kov, O.A. Evtikhieva etc. // *Ibid.* V. 3. P. 42–46.
- *Artiimov V.I., Yan'kov G.G.* Numerical efficiency analysis of various variants of deep pump electrical motor cooling for pumping-out the liquid medium from holes // *Ibid.* V. 7. P. 149–152.
- *Yan'kov G.G., Artiimov V.I., Karpov V.E., Zorin V.M.* Development and application of mathematical models of porous medium for numerical analysis of heat-and-mass transfer processes in NPP equipment elements // *MPEI Vestnik*. 2006. No 5. P. 72–86.

■ Patents

- *Patent 281002 RF.* Device for measurement of liquid and gaseous medium number / Yu.A. Kuzma-Kichta, O.S. Stepanov, G.I. Kiknadze, I.A. Gacheladze, M.A. Danilov, A.S. Anchishkin. 2005.

■ Dissertations

- *Ustinov A.A.* Investigation of liquid-vapour interface oscillations at boiling: Cand. Sci. (Techn.) Dissertation. 2005.
- *Chikunov S.E.* Peculiarities in plasmatron channels: : Cand. Sci. (Techn.) Dissertation. 2006.
- *Lazarev D.O.* Mathematical and numerical modeling of heat-and-mass transfer processes in metal-hydride devices for hydrogen storage and cleaning: : Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- «CATI» Co. Moscow
- Tupolev Aircraft Scientific and Engineering Complex, Moscow
- Russian Scientific Center «The Kurchatov Institute», Moscow
- Associated Institute of High Temperatures, Russian Academy of Sciences (IVTAN), Moscow

- Moscow Aviation Institute, Moscow
- Agilent Technologies Co., USA
- National Instruments Co., USA
- Research and Production Association «Energomash», Khimki, Moscow region
- «Proton-Permskie Motory», Perm

■ **Unique equipment**

- Experimental mercury facility for hydrodynamic and heat the transfer investigations of liquid-metal flow affected by magnetic fields (included in the list of unique setup of Russian Ministry of Sciences)
- Automated experimental facility for turbulence structure investigation
- Automated system for thermophysical experiments

ITPE GENERAL PHYSICS AND NUCLEAR FUSION DEPARTMENT (GPNF)

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At GPNF department:

45 teachers,

8 Ph.D. students.

Head of department Doctor of technical sciences,
Professor Alexander T. KOMOV

■ **Main Lines of Research**

Research Supervisor

- **Experimental and theoretical investigation of electrons and light ions interaction processes with heterogeneous multi-component surfaces of solid bodies**

Associated-Professor Afanas'iev V.P.

- **Optical-electronic methods of substances properties studying**

Associated-Professor Malakhov Yu.I.

- **Experimental and theoretical investigations of heat-and-mass transfer processes at extremely high energy density under conditions of phase transformations**

Professor Komov A.T., Associated-Professor Varava A.N.

- **Quantum electrodynamics and optics**

Professor Veklenko B.A., Ph.D. Sherkunov Yu.B.

- **Theoretical and experimental investigations of plasmotrons and plasma processes**

Professors Nguen-Kuok Shi, Chinnov V.F.

- **Computer technologies development and implementation in the teaching process and the practical training**

Professor Sedov A.N.

- **Analytical theory of solid body self-dispersion based on invariant dispersion principles**

Associated-Professor Manukhin E.V.

■ **Agreements, contracts, projects supported by the state budget**

- Scientific-academic center creation for young specialists training in area of Thermonuclear Fusion and plasma technologies
- Heat exchange and hydrodynamics of two-phase flows at intensive influence of mass forces
- Electron spectroscopy acting in real time mode for determination of sectioning structure of constructive material surfaces addressed to high temperature plasma
- Electron spectroscopy for the aluminium-niobium boundary morphology
- Theoretical and experimental investigations of free plasma arch
- Experimental investigation of heat exchange and transition conditions to film boiling mode at intensive one-sided corpuscular tube heating cooled by under-heated swirling flow
- Heat exchange and hydrodynamics in high-intensive processes of liquid-steam phase transitions
- Mechanisms of heat exchange and boiling crisis for the under-heated liquid under conditions of mass forces different intensity

■ Key publications

- *Afanas'iev V.P.* Sectioning profile analysis of hydrogen and helium isotopes by electron spectroscopy method // Poverkhnost. Rentgen, synchrotron and neutron investigations. 2005. No 3 P. 19–23.
- *Energy* spectra of electrons reflected from multi-layer targets with sharp and degraded division boundaries. Sectioning analysis / V.P. Afanas'iev, A.V. Lubenshenko, S.D. Fedorovich etc. // Poverkhnost. Rentgen, synchrotron and neutron investigations. 2005. No 3 P. 24–28.
- *Afanas'iev V.P.* Light ion dispersion in plane-parallel layers of solid body. Small-angle approximation // Izvestia RAS. Seria fizicheskaya. 2006. V. 70. No 6. P. 842–845.
- *Sherkunov Y.* Casimir Interaction Between Excited Atom and Dielectric Medium // Abstract Book. Photon 06. University of Manchester. September 2006. P. 126.
- *Sherkunov Y.* Casimir Interaction of Excited Media in Electromagnetic Fields // Abstract Book. Bio-dielectrics: Theories, Mechanisms and Applications. University of Leicester. April 2006. P. 51.
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- *Veklenko B.A., Sherkunov Yu.B.* Forced emission suppression by the coherent dispersion processes in boundary regions of excited medium // Prikladnaya fizika. 2005. No 1. P. 5–12.
- *Manukhin V.V.* Invariant submergence principles in problem of solid body self-dispersion // Pis'ma v ZHETF. 2005. V. 75. No 4. P. 11–18.
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- *Komov A.T., Erokhina A.M., Tokarev Yu.N.* Laminar flow mode in tubes with the helical band insertion // MPEI Vestnik. 2006. No 1. P. 29–33.
- *Varava A.N., Dedov A.V., Komov A.T., Yagov V.V., Zakharov E.M.* Boiling Heat Transfer In Swirl Flow of Subcooled Water at One-Sided Heating // ECI Conf. on Boiling Heat Transfer, Spoleto, Italy, May 7–12, 2006. Paper № 35.
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- *Varava A.N., Dedov A.V., Yagov V.V., Zakharov E.M.* Single-phase heat exchange investigation in swirling water flow at one-sided heating // Proc. of national conf. on thermal power engineering NKTE-2006, Kazan, Russia, 2006. P. 201–204.
- *Dedov A.V., Varava A.N., Yagov V.V., Zakharov E.M.* Investigation of hydraulic resistance and heat exchange in single-phase swirling flow at one-sided heating // Teplofizika vysokikh temperatur. 2006. V. 44. No 5. P. 699–708.

■ Dissertations

- *Lubenchenko A.V.* Theory of emission reflection by medium with anisotropic dispersion law on the basis of invariance principles: Dr. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Moscow Institute of Engineering Physics (MIFI), Moscow
- Moscow Physical and Technical Institute (MFTI), Moscow
- Bauman Moscow State Technical University (Bauman MGTU), Moscow
- St. Petersburg State Technical University (SPbGTU), Saint-Petersburg
- Russian Scientific Center «The Kurchatov Institute» (RNTs KI), Moscow
- Research Institute of Nuclear Physics of the Lomonosov Moscow State University (NIIYAF MGU), Moscow
- State Scientific Center «TRINITY», Troitsk, Russia
- «Institute of High Temperatures» Scientific Association, Russian Academy of Sciences (IVTAN), Moscow
- Efremov NIIIEFA, Saint-Petersburg
- Joint Institute for Nuclear Research (OYAI), Dubna, Moscow region.
- State Unitary Enterprise «The Dollezhal Research and Design Institute for Power Engineering» (FGUP NIIKIET), Moscow
- Joint Institute of Nuclear Investigations, Dubna
- Ioffe Physical and Technical Institute, Saint-Petersburg
- Analytical Center for Investigation of Surface Properties, Moscow
- Max Plank Institute, Germany
- Australia National University, Sydney,
- Chalmers Institute of Geteborg, Sweden

■ Unique equipment

- Test facility for Investigation of Material Properties Using the Spectroscopy of Reflected Electrons
- Test desk for secondary ion mass-spectrometry
- Spectral-photo-metrical experimental facility
- Experimental setup and arch DC plasmatron 3-4 kW in power for investigation of free plasma arch
- Test desk for investigation of the heat transfer crisis in nuclear fusion beam receivers designed for operation at the high density of the energy
- The automatic data acquisition system on the base of KAMAK standard and MEK 625.1 instrument interface
- Experimental setup and high-frequency inductive plasmotron with frequency 27 MHz, power 4-5 kW for investigation of non-equilibrium plasma of corpuscular and molecular gases

INSTITUTE OF PROBLEMS IN ENERGY EFFICIENCY (IPEE)

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- Departments
and Divisions
of Institute**
- **Industrial heat-and-power engineering systems department (IHPEs)**
 - **High temperature technology energetic department (HTTE)**
 - **Industrial economics and enterprises management department (IEEM)**
 - **Heat-and-mass transfer processes and facilities department (HMTPF)**
 - **Chemistry and electrochemical power engineering department (CEPE)**
 - **Scientific-and-Technical innovation center of energy conservation technologies and equipment (STICECTE)**
 - **Research Lab of global energy problems (RL GEP)**
 - **R&D department «Management problems in energy and resources saving» (MPERS)**

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At IHPES department:
19 teachers,
3 researcher,
7 Ph.D. students.

Head of department
Doctor of technical sciences,
Winner of RF Government Award,
Professor Viacheslav A. RYZHENKOV

■ Main Lines of Research

Research Supervisor

- **Increasing of energy effectiveness, reliability and exploitation resource of thermal power equipment**

Professor Ryzhenkov V.A.

- **Analysis, investigation and rationalization of mutual producing heat and cold combined cycles. Efficiency increasing of air and gas supply systems at enterprises**

Associated-Professor Kalinin N.V.

- **Energy saving at industrial products manufacturing (high-efficient heat schemes, heat-and-mass exchange intensification)**

Professor Shelginskiy A.Ya.

- **Physical models of anisotropic turbulence. Non-traditional and renewable energy sources**

Professor Motulevich V.P.

- **Reliability and exploitation effectiveness increase for power engineering and pumping equipment**

Senior researcher Volkov A.V.

- **Hydrodynamical investigations of dynamic pump settings, exploitation reliability increasing methods development for pumping equipment of thermal power engineering objects**

Senior researcher Volkov A.V.

- **Development of high-effective hydrodynamical recuperation systems using the redundant main pressure of technological liquids**

Senior researcher Volkov A.V.

- **Heat transformer operation modes analysis (heat pumps and refrigerators)**

Associated-Professor Martynov A.V.

- **Mathematical modeling and optimization of the energy-technological schemes of metallurgical complex on energy and ecology criteria**

Senior researcher Sultanguzin I.A., Khromchenkov V.G.

- **Estimation of influence on the environment in accordance with technique Impact Pathway**

Senior researcher Sultanguzin I.A.

- **Energy audit and rationalization of heat-and-energy supplying systems in industrial enterprises**

Khromchenkov V.G.

- **Systems of heat and energy supply of autonomous consumers using the non-traditional energy sources**

Associated-Professor Spiridonov A.G.

- **CAD systems in heat and energy installations and systems**

Associated-Professor Sakharov S.S.

- **Optimization of construction, heat schemes and exploitation modes of thermal power engineering installations, implementation of resource and energy saving technologies and equipment**

Kulichikhin V.V.

■ **Agreements, contracts, projects supported by the state budget**

- Development of technical-economical optimization technique of effective energy supply variants for the territorial region of Extreme North removed from the central energy supply systems (on example of Saha Republic).
- Reliability and functioning effectiveness increase of pumping equipment with the aid of modification of dynamical pump settings
- Effectiveness and operation reliability increase with the aid of hydrophobic covering usage
- Investigation of formation process and development the approach to decrease the growth speed for the thermal-barrier deposits on the heat exchanging surfaces of thermal power engineering equipment
- Determination of technological standards for losses and heat energy and heat carrier expenses in heat mains of JSC «OGK-3» (in the structure of Gusinooziorskaya Power Station Kharanorskaya Power Station, Cherepetskaya Power Station, Yuzhnouralskaya Power Station)
- Complex heat exchange and renewable energy sources

■ **Key publications**

- *Volkov A.V., Pankratov S.N.* Pumping equipment damages analysis on the thermal power engineering objects // *Tiazhioloe mashinostroenie*. 2005. No 10. P. 26.
- *Volkov A.V., Davydov A.I., Pomortsev M.Yu., Trishkin S.K.* Line pumps adaptation methods to the real conditions of heat lines exploitation // *Elektricheskie stantsii*. 2005. No 11. P. 53–57.
- *Volkov A.V., Pankratov S.N., Parygin A.G.* Analysis of line pumps hydrodynamical properties in power units 100 MW // *Nasosy i oborudovanie*. 2006. No2. P. 25–27.
- *Kulichikhin V.V.* Starting mode perfection of TPP steam turbines: Proc. of XXXVII power engineering congress in Dresden technical university (Germany). 2005. P. 34.
- *Kulichikhin V.V.* Maneuverability increase of TPP turbine aggregates // *Ibid.* 2005. P. 35.
- *Kalinin N.V., Zhuchkov A.V.* Peculiarities of decentralization fulfillment in air supply systems of enterprises // Proc. of All-Russia conf. «Resource saving and ecological safety», Smolensk, 2006.
- *Bystritskiy G., Kireeva E., Kalinin N.* Economical efficiency of pump frequency regulation // *Glavnyi energetik*. 2005. No 5. P. 23–25.
- *Potentially* dangerous substance identification in TPP technological medium / V.A. Ryzhenkov, O.V. Starikova, Yu.M. Sokolova, N.A. Nariadkina // *Novoe v rossiyskoi elektroenergetike*. 2005. No 1. P. 34–41.

- *Seleznirov L.I., Ryzhenkov V.A.* Estimation of incubatory period duration for the erosion deterioration of constructive materials // *Teploenergetika*. 2005. No 4. P. 61–63.
- *Determination* of factual residual resource of eroded working blades of the last stages CLP of powerfu steam turbines / V.A. Ryzhenkov, A.V. Kurshakov, A.A. Bodrov, I.E. Bokarev // *Novoe v rossiyskoi teploenergetike*. 2005. No 12. P. 34–37.
- *Motulevich V., Timakova O.* System of Solar Energy Accumulation for Hot Water Supply and Heating // *Proc. Intern. Conf. «The Integration of the Renewable Energy Systems into the Building Structures»*, Patra Greece 7–10 July 2005. P. 193–198, CD.
- *Kukhartsev V., Motulevich V., Spiridonov A.* Power System on the Basis of Wind-generated Compressed Air. // *Proc 9th World Renewable Energy Congress, Florence, 2006*, CD.

■ Patents

- *Patent 51619 RF.* Device for hydrophobization of dynamic pumps settings using the cappillary-active corrosion inhibitors / A.V. Volkov, M.Yu. Pomortsev, V.A. Ryzhenkov / *BI*. 2006. No 6.

■ Dissertations

- *Kukhartsev V.V.* Parametric characteristic perfection for energy effective and ecologically safe systems of combined heat and energy supply of autonomous consumers on the basis of wind installations: *Cand. Sci. (Techn.) Dissertation*. 2005
- *Sultanguzin I.A.* Scientific and technological bases of modeling and optimization of energy-technological system of the metallurgical industrial complex: *Dr. Sci. (Techn.) Dissertation*. 2005.
- *Timakova O.V.* Calculation method perfection of the main energy indexes and characteristics wind power engineering: *Cand. Sci. (Techn.) Dissertation*. 2006.

■ Partners

- The university of France "Ecole de mine de Paris"
- Joint-stock company "Metallurgical industrial complex "Severstal"", Cherepovets
- Technical university of Berlin, Germany.
- University of Piza, Italy
- Open Joint-Stock Company «Unified Energy System of Russia»
- MCPK company, Moscow
- «Sigma», Czech Republic
- International committee on heat and mass exchange, Ankara, Turkey
- Institute of solar techniques, Rappersville, Switzerland
- Shubauer technological institute, Tokyo, Japan
- Scientific planning and production association «Ecotep» (Moscow)
- Armstrong International Inc., USA
- Turbine Plant, Kaluga
- Ministry of Municipal Economy of Moscow Region
- Scientific Center named after Keldysh
- Moscow Oil-Processing Plant

- ❑ Unique equipment
- ❑ Setup with heat pumps
- ❑ Setup for testing of vortical heat generators
- ❑ Setup for thermal insulation efficiency determination
- ❑ System of decentralized heat supply based on vortical heat generator

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At HTTE department:

16 teachers,

5 researchers,

10 Ph.D. students.

Head of department Ph.D.

Associated-Professor

Tatiana A. STEPANOVA

■ Main Lines of Research

Research Supervisor

□ **Intensive energy saving in heat technologies**

Professor Kliuchnikov A.D., Associated-Professor Stepanova T.A.

□ **Heat technology development for the power-consuming industry branches (mining and non-ferrous metallurgy, building material industry, machinery etc.)**

Professor Kliuchnikov A.D., Associated-Professors Morozov I.P., Popov C.K., Kuz'min V.N.

□ **Development of technological equipment of new generation: smelting chambers (furnaces of various technological purposes, high-temperature melting-recovery and melting-oxidizing reactors, heating and thermal furnaces, heat generators, fuel-burning devices, regenerative and external heat usage elements, steam-piston engines, mini-TPP elements**

Associated-Professors Stepanova T.A., Ippolitov V.A.,
senior researchers Dubinin V.S., Volkov V.I.

□ **Development of energy and material saving solid garbage processing method on the basis of the intensive energy saving conception**

Associated-Professor Stepanova T.A.

□ **Development of promising energetic basis and control algorithms for area of industrial garbage circulation and consumption with account of deep system-defined resource and energy savings**

Associated-Professor Stepanova T.A., Ushakov M.A.

□ **Development of promising energetic basis and control algorithms for local fuel flows in RF regions with account of deep system-defined energy savings**

Associated-Professor Stepanova T.A., senior researcher Tumanovskiy V.A.

□ **Development, investigation and approbation of new heat technical principles of technological processes, structural and parametrical optimization of heat schemes for technological process registration for raw material processing, heating and half-finished product and article thermal processing**

Senior researcher Tumanovskiy V.A.

□ **Development of energy saving heat schemes and energy saving technological equipment for building-material manufacture**

Associated-Professors Troyankin Yu.V., Sokolov B.A., Kuz'min V.N.

□ **Energy audit of industrial enterprises, development of actions to perfect the fuel-energy enterprise and region balance, fuel-energy resources saving on the basis of deep energetic modernization of heat technological systems for manufacture of cast iron, steel, non-ferrous and less-**

common materials, rolled metal, concrete, glass, ceramic articles, fertilizers

Associated-Professor Morozov I.G., senior researcher Smirnov V.M.

□ **Development of thermal garbage sterilization (burning)**

Senior researcher Volkov V.I., associated-professors Ippolitov V.A., Stepanova T.A.

□ **Certification and other tests of gaseous and liquid fuel burners and gas-using equipment**

Associated-Professor Morozov I.P., senior researchers Smirnov V.M., Tumanovskiy V.A.

□ **Heat technology processing of solid low-grade fuels (burning, gasification, pyrolysis, coking)**

Senior researcher Beliaev A.A.

□ **Mathematical modeling of heat technology installations and systems**

Associated-Professor Popov C.K.

□ **Development of processes and apparatuses for protective gaseous medium formation from the hydrocarbon raw material**

Ph. D. Kiseliova M.V.

□ **Development of technologies and devices for water-fuel emulsion obtaining, cavitation technologies for application in area of environment protection**

Senior researcher Volkov V.I.

■ **Agreements, contracts, projects supported by the state budget**

- Development of energy saving and ecologically friendly heat technological system of continuous combined processing of raw and slightly-concentrated iron ore on the basis of its high-temperature non-coking recovering by the products of natural gas thermal decomposition
- Development of energy saving heat technological system for wasteless processing of the sulfide ore concentrates to blister copper with sulfur and iron extraction realizing the continuous batch melting with the next liquid melt recovering processing
- Development of energy saving heat technological system for processing of the flaming metallurgical slag into the fused concrete clinker
- Development of cyclone energy-technological aggregates for hydro-thermal processing of phosphate raw into the chemical fertilizers and forage adjuncts
- Development of skull glassmaking furnace of cyclone type for long batch boiling in the system of liquid glass manufacture by sulfate and soda technologies
- Gas furnace development for oxidizing graphite loosing
- Energy audit of building industry enterprise and chemical industry
- Development of automated system for nitrogen oxide formation suppression in metallurgy
- Development of methodology and instrumental means for complex regional programs formation for energy effective utilization the industry and consuming wastes
- Development of installation for thermal sterilization of wastes contained the poison substances
- Development of standards, methodological and logistic basis of the certification tests of gas-using equipment
- Development of methodological basis for energy effectiveness control for local fuel processing of Russia regions using the energy potential of industrial, rural, and municipal wastes

■ Key publications

- *Kliuchnikov A.D.* Technology energetics // Ppomyslennaya teploenergetika 2006. No 11.
- *Stepanova T.A., Ushakov M.A.* Effective involving methods of energy-carrying industrial and domestic wastes into regional fuel-energy balances // MPEI Vestnik. 2005. No 1. P. 32–39.
- *Stepanova T.A., Ushakov M.A.* Substantiation of utilization technology involving for the solid domestic wastes into heat energetics of town and regions // Proc. of II Intern. conf. «Modern energy saving heat technologies»: MPEI Publishing House, 2005. V. 2. P. 145–147.
- *Stepanova T.A., Ushakov M.A., Nikolaev D.A.* Modeling and optimization of the fuel potential of domestic wastes usage on example of Kolomenskiy region // Proc. of 3rd All-Russia school-seminar of young scientists «Energy savings – theory and practice». MPEI Publishing House, 2006. P. 117–124.
- *Ivanov Yu.K., Popov S.K.* Melting chamber with perforated layer of technological material // Steklo i keramika. 2005. No 12. P. 22–28.
- *Popov S.K.* Development and identification of tunnel oven mathematical model // MPEI Vestnik. 2006. No 1. P. 22–28.
- *Dubin V.S., Lavrukhin K.M., Stepanova T.A., Titov D.P.* Wood and vegetable wastes usage for obtaining the artificial ecologically friendly solid fuel for decentralized energy supply in Russia // Ppomyslennaya energetika. 2006. No 9. P. 44–48.
- *Lopatin M.Yu., Morozov I.P.* Optimization of sulfide copper-bearing polydispersed materials processed in the suspended layer // MPEI Vestnik. 2006. No 2. P. 11–15.

■ Partners

- RAO EES Rossii, Moscow
- RAO Gazprom company, Moscow
- DOAO Promgaz company, Moscow
- Center of Introduction of New Technologies of the Ministry of Railways Transport of – Energotekhmontazh commission-and-adjustment directorate, Moscow
- Promotkhody (Industrial Waste) State Enterprise, Moscow
- All-Russia Research Institute of Chemical Industry (VNHKhT), Moscow
- Fertilizer and Fungicide Research Institute (NIIUIF), Moscow
- NPO Tekhnergokhimprom scientific-and-production association, Moscow
- the Russian Federation, Moscow
- Moscow Aviation University, Moscow

■ Unique equipment

- 1 -MW/ test bed for certification testing of gas-burner devices and gas-utilizing equipment
- Cyclone-converter process reactor designed for effective realization of melting, melting-and-oxidation, and melting-and-reduction processes with natural mineral materials and charges subjected to thermal-technology treatment in high-temperature vortex suspension of matter in gas, in a film of melt, and in a convective bath operating in an active hydrodynamic mode
- Revolving-fluidized-bed reactor designed for pyrorefining of a wide range of solid and paste-like waste

- ❑ Cyclone reactor for pyroforming of highly concentrated toxic sewage containing organic and mineral substances
- ❑ Gas-fired heating chamber furnace for the investigation of processes of heating and thermal treatment of articles and blanks of metal, ceramic, and other materials
- ❑ Straight-line furnace with variable characteristics of radiating flame and geometry of the working chamber for the investigation of heat transfer and testing of the means for special measurements, equipped with an automated research system enabling one to use mathematical methods of planning experimental investigations
- ❑ Cyclone-type firing stand designed for pyrorefining of liquid industrial waste and for testing burner devices of new types, including gas-oxygen burners for industrial applications
- ❑ Through-flow-vortex reactor with a fluidized-melt bath 30-kW electric generator with a gas-turbine

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At IEEM department:
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Head of department Doctor of technical sciences,
Professor Nikolay D. ROGALEV

■ **Main Lines of Research**

Research Supervisor

- **Development of innovation complex infra-structure. Elaboration of normative-lawful and methodical bases in area of research-innovative activity**

Professor Rogaliov N.D.

- **Economical and management problems of energy savings in power engineering, industry, housing services**

Professor Rogaliov N.D.

- **Management of intellectual property: economical and lawful aspects**

Professor Rogaliov N.D.

- **Technological transfer and technology commercialization in university**

Professor Rogaliov N.D.

- **Development of estimation methods for investment project economical effectiveness**

Associated-Professor Zubkova A.G.

- **Investigation of organization and economical aspects for development of technologies for hydrogen application in power engineering**

Professor Rogaliov N.D.

■ **Agreements, contracts, projects supported by the state budget**

- Development of automated reference-informational system on dissertations passing through Higher Attestation Commission of Russian Federation
- Development of methodical recommendations on strategic planning of enterprise development using the economical methods of quality control (on example of electrical branch)
- Investigations of HTPP and boiling-house competitiveness conditions on the local markets of heat energy
- Generalization of technical—economical solutions on the energy resource registration, monitoring and energy savings at the demonstration objects and their duplication in the urban communal complex
- Research-organizational, methodical and technical guarantee of organization and support on international research-academic centers and providing on the basis of combined usage of material-technical and cadre possibilities of mutual research, development of innovational activity and high-technology Russian product and services promotion into international markets — «Academy of research-technological innovations»

■ Key publications

- *Rogalev N.D.* Investigation of growth stages of Russian investment companies // Proc. of All-Russian conf. «Energia molodykh – ekonomike Rossii». Tomsk: IF TPU Publisher, 2005. P. 45–47.
- *Rogalev N.D., Repetskaya E.V.* Process approach for formation of organization-economic structures in housing-communal complex // Ibid. P. 67–69.
- *Frey D.A.* Investigation of HTTP profit maximization conditions at operation on the competitive electric energy market // Proc. of VI All-Russia conf. of young researchers «Molodiozh, Obrazovanie, Ekonomika». Yaroslavl': «Remder» Publisher, 2005. V. 2. P. 210–218.
- *Kurdiukova G.N., Milykh M.V.* Estimation of intellectual property. // Proc. of VI Intern. conf. «Financial problems of RF and ways of its solutions: theory and practice. Sankt-Peterburg: Polytechnic University Publisher, 2005. P. 644–646.
- *Kurdiukova G.N., Ochelkova E.Yu.* Joint-ventures with foreign investments and its role in internation co-operation widening // Ibid. P. 650–651.
- *Schev'eva V.A.* Education quality increase – main condition of European education attraction // Proc. of conf. on problems of engineering education: MPEI Publishing House. 2005. P. 57–58.
- *Rogalev N.D., Tabachny E.M.* Experience of progressive education technology implementation at Department of Industrial Economics and Enterprise Management // Ibid. P. 82–85.
- *Shuvalova D.G.* HTTP competitiveness estimation by radar method // Proc. of VII Intern. conf. «Ekonomika, ecologia i Obschestvo Rossii v 21 stoletii». Sankt-Peterburg: SPSPU Publisher, 2005. P. 34–38.
- *Rogalev N.D., Fiodorova S.E., Nekrasova E.A.* Development of forecasting methods for regional energy consumer // Proc. of II Intern. conf «Modern energy saving heat technologies (drying and heat processes) SETT–2005: VIM Publisher, 2005. V. 2. P. 125–127.
- *Sennova E.V., Fediaev A.V., Nekrasova E.A.* Implementation way investigation of energy saving industrial technologies in the limits of level optimization fuel-economical balance // Proc. of conf. «Gas supply development problems for Russian regions: Promgas Publisher, 2005. P. 78–84.
- *Kostyrina A.S., Blinova V.A., Fiodorova S.E., Nekrasova E.A.* To question of gas consumer paying capacity analysis // Ibid. P. 142–149.
- *Zhyravliova M.V.* Credit buro «slipping» // Konsul'tant No 1 (January 2006). Beratorpress Publisher, 2006. P. 22–23.
- *Zhyravliova M.V.* Financial safety ensure methods // Ibid. P. 56–57.
- *Rogalev N.D., Solomatova M.V.* About lawful status of intellectual property objects created at the expenses of state budget in the university // Innovatsii. 2006. No 5. P. 77–79.
- *Zubkova A.G., Bunak T.A.* Development necessity of energy-sale company marketing strategy // Proc. of VII All-Russia conf. of young researchers «Molodiozh, Obrazovanie, Ekonomika». Yaroslavl': «Remder» Publisher, 2006. P. 152–153.
- *Rogalev N.D., Solomatova M.V.* Development and implementation of choice algorithm in method of intellectual property estimation on the example of Moscow Power Engineering Institute // Ibid. P. 226–230.
- *Solomatova M.V.* Forms of university international co-operation in area of innovation activity // INNOVATIKA–2006: All-Russia conf. Ul'ianovsk: ULGU Publisher, 2006. V. 1. 108 p.

- *Peisakhovich V.Ya., Shuvalova D.G.* Energy saving implementation aspects // Proc. of III All-Russia school-seminar of young researchers «Energy saving – theory and practice»: MPEI Publishing House, 2006. P. 347–349.

■ Dissertations

- *Ganzer Ya.N.* Investment analysis models for the lifetime prolongation of nuclear power plant power units of first and second generation: Cand. Sci. (Econ.) Dissertation. 2005
- *Ketoeva N.L.* Perfection of adjustment methods of organizational structures for innovation processes management: Cand. Sci. (Econ.) Dissertation. 2005
- *Repetskaya E.V.* Influence estimation of the organization-economical factors on the increase of branch investment attraction (on the example of housing-communal services): Cand. Sci. (Econ.) Dissertation. 2006.

■ Partners

- RAO «EES Rossii», Moscow
- MPEI Science Park, Moscow
- «ESKOTEK» company, Moscow
- «Research-industrial enterprise TURBOKON», Kaluga
- UlaanBaatar University, Ula-Bator, Mongolia
- Russian-Chinese Technopark «Druzhba», Moscow
- «ENTEK» company, Moscow

At HMPF:
20 teachers,
21 Ph.D. students.

Head of department Ph.D. (Techn.),
Associated-Professor Andrey B. GARYAEV

■ Main Lines of Research

Research Supervisor

- **Stationary and non-stationary two-phase heat transfer and hydrodynamics. Heat transfer at liquid film boiling**

Professor Pavlov Yu.M.

- **Development of heat and mass transfer calculation methods at drying of humid materials and drying units optimization. Energy saving in industry**

Professor Danilov O.L.

- **Numerical modeling of hydrodynamics and heat transfer non-stationary processes at turbulent flow of non-compressible and compressible liquid in channels. Development of turbulent transfer models for linear momentum, heat and mass at free heat-concentration convection**

Professor Valueva E.P.

- **Single-phase characteristic calculation for heat transfer and friction in tubes, channels and objects of various form**

Professor Sergievskiy E.D.

- **Transfer process investigation in industrial apparatuses with physical and chemical transformations and impurity distribution in atmosphere**

Associated-Professor Garyaev A.B.

- **Development of heat energy saving methods at industrial enterprises. Thermal cleaning of manufacturing water against organic and non-organic impurities. Heat transfer intensification methods**

Associated-Professor Efimov A.L.

- **Development, investigation and modeling of elements of heat regime providing systems for autonomous objects and artificial climate installations**

Associated-Professor Sasin V.Ya.

- **Intensification methods development and modeling for heat-hydraulic processes in viscous Newtonian liquids**

Professor Nazmeev Yu.G.

■ Agreements, contracts, projects supported by the state budget

- Technical offer development on vapor-supply system modernization for «Shatura»
- Development of technique for thermal imaging electrical equipment inspection mounted in housing and administrative buildings
- Mathematical model development and calculation investigations fulfillment for cooling system of low-power unit elements
- Development and design of heat energy heat-utilizer for exhaust gas from clinker furnace
- Development of software-methodical complex for qualification increase of educational institutions specialists in area of energy savings

- Preparation of textbook on discipline «Energy saving in thermal power engineering and heat technologies»
- Steam condensation process investigations for steam-gas mixtures in heat-consuming installations and heat-exchange apparatuses for deep utilization of exhausted gas heat
- Modeling and numerical investigation methods development for masout circulation heating in large capacity reservoirs
- Experimental investigations in area on heat-exchange intensification at laminar flows of viscous liquids in industrial heat-exchange apparatuses
- Experimental investigations of heat-exchange processes at laminar flows of non-linear viscous liquids in the channels with transverse discrete roughness
- Heat-exchange process investigations at laminar flow of Newtonian liquids in profile-spiral channels
- Investigation and usage effectiveness estimation for heat-recovery boiler at petrochemical industry enterprises
- Development of physical model for heat crisis transfer in the channels in region of high reduced pressure
- Drying kinetics investigation and optimization in installations for drying of suspended liquid and solid materials
- Investigation of heat emission and resistance at non-stationary turbulent flow of compressible liquid in the channel under conditions of resonant expense oscillation
- Investigation of heat-transfer and flow peculiarities in pulsating turbulent flow of compressible gas

■ Patents

- *Patent 43345 RF.* MPK F 25 B 11/02. Expander-generating installation / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov, A.V. Koriagin // Bl. 2005. No 1.
- *Patent 43630 RF.* MPK F 25 B 11/02. Expander-generating installation / V.S. Agababov, A.Yu. Arkharova, A.R. Andreev etc. // Bl. 2005. No 3.
- *Patent 49199 RF.* MPK F 25 B 11/02, F 01 K 27/00. Expander-generating installation / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov // Bl. 2005. No 31.
- *Patent 46565 RF.* МПК F 25 B 11/02, F 01 K 27/00. Installation for providing the electric energy, heat and cold / V.S. Agababov, A.Yu. Arkharova, N.F. Malafeeva // Bl. 2005. No 19.
- *Patent 57433 RF.* МПК F 25 B 11/02, F 01 K 27/00. Expander-generating installation / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov, A.V. etc. // Bl. 2006. No 28.
- *Patent 57434 RF.* МПК F 25 B 11/02, F 01 K 27/00. Expander-generating aggregate / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov, A.V. etc. // Bl. 2006. No 28.

■ Key publications

- *Valueva E.P.* Hydrodynamics and heat-transfer at turbulent liquid flow in tube under the condition of expense monotonous changing in time // Teplofizika vysokikh temperatur. 2005. No 2. C. 212–222.
- *Valueva E.P.* Hydrodynamics and heat-transfer at pulsating turbulent flow of liquid with the varying properties in round tube // Teplofizika vysokikh temperatur. 2005. No 6. P. 888–896.
- *Valueva E.P., Kulik A.A.* Convection heat-transfer process peculiarities at pulsating turbulent gas flow in the tube // Teploenergetika. 2006. No 5. P. 50–55.

- *Valueva E.P.* Hydrodynamics and heat-exchange at pulsating turbulent gas flow in heated tube // *Teplofizika vysokikh temperatur*. 2006. V.44. No 6. P. 118—126.
- *Nazmeev Yu.G., Daminov A.Z.* Structural and thermodynamical analysis of double-tube closed scheme of centralized urban heat supply // *Izvestia RAS. Energetika*. 2005. No 6.
- *Nazmeev Yu.G., Lifshitz S.A.* Bifurcation analysis of energy equation for laminar flow of viscous liquid in round tube under heat boundary conditions of second type // *Izvestia RAS. Energetika*. 2005. No 6.
- *Nazmeev Yu.G., Mingaleeva G.R.* Thermodynamic effectiveness of coal drying process in fuel treatment systems with central dust-plant // *Izvestia RAS. Energetika*. 2005. No 6.
- *Koriagin A.V.* Different ways effectiveness comparison for gas heating before expander in boiling houses // *MPEI Vestnik*. 2005. No 5. P. 18—22.
- *Arkharova A.Yu., Agababov B.S., Koriagin A.V.* Comparison analysis of various ways gas heating influence in expander-generating aggregate based on TPP heat efficiency varying // *Izvestia vuzov. Problemy energetiki*. 2005. No 1,2. P. 11—21.
- *Zakharov S.V., Nosov A.M., Pavlov Yu.M.* Heat transfer crisis in annular-dispersed flow regime at high vapour quality // *MPEI Vestnik*. 2006. No 5. P. 100—105.
- *Garyaev A.B.* Investigation of temperature and enthalpy distribution in surface condensation heat-utilizers // *Teploenergetika*. 2005. No 7. P. 55—59.
- *Energy* saving on industrial and housing-communal enterprises: Reference / under edition of O.L. Danilov, P.A. Kostiuhenko, 2006. 670 p.

■ Dissertations

- *Kovalenko A.P.* Decoding method perfection for thermal imaging at heat streams determination under condition of heat-exchange complicated by mass-exchange: Cand. Sci. (Techn.) Dissertation. 2005.
- *Berezhnaya O.K.* Heat-hydraulic process modeling and development of effective heat-exchanger data generalization technique: Cand. Sci. (Techn.) Dissertation. 2006.
- *Nefiodova N.I.* Heat-and-mass transfer processes modeling at utilization of high-humid heat secondary energy resources: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Paris Higher School of Arts and Crafts, Paris, France
- University of Pisa, Pisa, Italy
- Kazan research center of RAS (Research Center of Power Engineering Problems)
- Unique equipment
- Measuring complexes for automated data acquisition in the process of thermophysical investigations
- Climatic chamber of thermal-and-moisture treatment of air for testing refrigeration-and-drying units
- Hot-wire anemometers manufactured by TCA (USA) and Dantec Electronic (Denmark)

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At CEPE department:
20 teachers,
5 researchers,
6 engineers,
8 Ph.D. students.

Head of department
Doctor of technical sciences,
Prof Nikolay V. KULESHOV

■ Main Lines of Research

- **Investigations and development of electrolytic cells, fuel cells with alkaline and and electrolyses polymer electrolite membrane (PEM)**
Research Supervisor
Assoc.-Prof. Kuleshov N.V.
- **Development of portable fuel elements**
Professor Korovin N.V.
- **Development of power installations on the basis of high-temperature solid oxide fuel cells (SOFE)**
Professor Korovin N.V., Ph.D. Slavnov Yu.A.
- **System analysis and optimization of electrochemical power installations**
Professor Nesterov B.P.
- **Development of lithium current sources with polymer electrolyte**
Senior researcher Smirnov S.E.
- **Electrochemical problems of hydrogen energetic**
Senior researcher Nafiodkin S.I.
- **Investigations of bio-fuel cells**
Associated-Professor Osina M.A.
- **Creation of current sources of new generation for autonomous objects supply**
Associated-Professor Adamson B.I.
- **Nano-technologies in fuel cells**
Associated-Professor Yashtulov N.A.

■ Agreements, contracts, projects supported by the state budget

- Investigation of electrocatalytic and heat-and-mass exchange processes in hard-polymer fuel cells
- Investigations and development of portable fuel cells, testing bench creation for electrochemical measurements
- Conceptual project creation for hybrid energy installation on the base of high-temperature fuel cells
- Lithium accumulator on the base of nano-structured elements
- Development of pilot and manufacturing base preparation for alkaline hydrogen generator of new generation
- Creation of structured composite materials-electrocatalysts on the basis of ferments for bio-fuel cells
- Development of current sources of new generation for autonomous objects supply

- Modernization of GASEL car to gasoline-hydrogen fuel compositions
- Maintenance and support of joint usage center «Hydrogen energetic and electrochemical technologies» by research equipment to execute the researches on the basis of priority directions

■ Key publications

- *Chemical* current sources: reference / under edition of N.V. Korovin, A.M. Skundin: MPEI Publishing House, 2005. 740 p.
- *Korovin N.V.* Fuel cells and electrochemical energy installations: MPEI Publishing House, 2005. 280 p.
- *Kuleshov N., Fateev V., Grigoriev S.* Electrochemical Technologies in Hydrogen Energetics, MPEI, 2007, 104 p.
- *Fateev V., Grigoriev S., Kuleshov N.* Mathematical Modeling of PEM Fuel Cells // Intern. Hydrogen Energy Cong. and Exhibition IHEC 2005 Istanbul, Turkey, 13–15 July 2005.
- *Nesterov B.P.* Methodic bases of optimization, system research of electrochemical energy installations and units // Proc. of Intern. symp. on hydrogen energetic: MPEI Publishing House, 2005. p. 43–46.
- *Ramenskiy A.Yu., Shelisch P.B., Nefiodkin S.I.* Hydrogen application on car transport: perspective on Russian market // Ibid. P. 169–173.
- *Tarasevich M.P., Kirichev Z.P., Osina M.A.* Methanol oxidation and other low-molecular spirits in alkaline medium with Ru – Ni – catalyst // Elektokhimiya. 2005. V. 41. No 7. P. 829–839.
- *Korovin N.V., Slavnov Yu.A.* Efficiency factor calculation for hybrid electrical station with high-temperature fuel cells // Elektrokhimicheskaya energetika. 2005 V. 5. No 4. P. 235–240.
- *Smirnov S.S., Adamson B.I.* Chemical current sources with hard-polymer electrolyte / / Proc. 2nd Intern.conf. «Investigations, development and application of high technologies in industry». Sankt-Peterburg, 7–9 of Febr. 2006. P. 162–163.
- *Putsylov I.A., Smirnov S.E.* Current sources for smart-cards // Naukoiomkie tekhnologii. 2006. V. 7. No 9. P. 15–18.
- *Putsylov I.A., Smirnov S.E.* Development of lithium-manganese-dioxide elements with hard-polymer electrolyte // MPEI Vestnik. 2006. No 2. P. 68–72.
- *Klimenko A.V., Korovin N.V., Kuleshov N.V., Malyshenko S.V.* Experts training on the hydrogen energetic in Moscow Power Engineering Institute (Technical University) / / Intern Forum «Hydrogen technologies for energy production» 6–8 of Febr. 2006, Moscow, «President-Hotel». P. 245–249.

■ Patents

- *Patent PCT No WO 2005/078834.* Implementation method of hardphase lithium current source / V.P. Chebotariov, S.E. Smirnov. 2005.

■ Dissertations

- *Kuleshov N.V.* Special theme: Dr. Sci. (Techn.) Dissertation. 2005.
- *Smirnov S.E.* Special theme. Dr. Sci. (Techn.) Dissertation. 2005.
- *Grishin M.V.* Investigation and development of gas-selective electrochemical sensor for hydrogen analysis in liquids and gases in thermal power engineering: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Kurchatov Institute Russian Scientific Center, Moscow
- Institute of High Temperatures RAS, Moscow
- Institute of Chemical Physics and Electrochemistry, Russian Academy of Sciences (IKhF RAS), Moscow
- ASPEKT association, Moscow
- ENERGIA company, Elets city
- R&IA KVANT, Moscow
- National Association of hydrogen energetic of Russia, Moscow
- URALKHIMMASH company, Ekaterinburg
- Al'tern scientific-and-production association (NPO Al'tern), Elektrougli, Moscow Region
- «Hydrogenics Corporation», Germany
- «Stuart Energy», Belgium

■ Unique equipment

- Atomic-absorptive Kvant-Z.ETA spectrometer
- IR Specord M-80 IR-spectrophotometer
- Spectrophotometer for water analysis DR/2500. USA
- Wide-band potentiostate-galvanostate SOLARTRON SI1287, UK
- Potentiostates PI-50-1 with programmer PR-8
- Gases sorption analyzer NOVA 100e, USA
- Setup HYSTAT for hydrogen production, Belgium
- Testing Bench for fuel cell tests FAST G-60, Canada

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At STIC ESTE:
25 researchers,
16 engineers.

Center director
Ph.D., Associated-Professor
Anatoly G. VAKULKO

■ **Main Lines of Research**

Research Supervisor

- **Scientific-methodic bases of energy saving on the basis of regional and inter-regional priority**
Associated-Professor Vakulko A.G.
- **Methodology of information-analytical energy saving system formation for sectoral and regional projects**
Ph.D. Bobryakov A.V.
- **Methodic bases of energy inspections of industry, power engineering, transport and housing-communal services**
Associated-Professor Zlobin A.A.
- **Scientific bases of expander-generating aggregates application in gas supply systems**
Senior researcher Agababov V.S.
- **Creation of energy generating stations of guaranteed supply on the basis of small and renewable energy sources**
Ph.D. Gribkov S.V.

■ **Agreements, contracts, projects supported by the state budget**

- Software development for information-analytical system of energy certification and passport system of educational institutions
- Normative-methodic documents and software development for «Energy Bureau of Educational Institutions» organization and functioning
- Development of structure principles and algorithms of modern program-module measuring facilities for energy indexes
- Development of creation technique and software elements for the information-analytical system
- Development of sectoral information system for statistical information collecting and analysis concerning energy consumption and energy effectiveness
- Renewable and non-traditional energy sources application for supply of distributed objects

■ Key publication

- *Vakulko A.G.* Formation of regional and inter-regional priority // Energeticheskaya politika. 2005. No. 6. P. 14–19.
- *Vakulko A.G., Makarychev P.K., Konchalovskiy I.P.* Facilities for electric energy quality indexes measurement. Modern solutions // Proc. of III Intern. Conf. «Renewable and small energetic»: Moscow, 2006. P. 130–134.
- *Development* of information-analytical system of educational institutions energy certification / A.G.Vakulko, A.V. Bobriakov, A.C. Vorob'iov etc. // Energeticheskaya politika. 2005. No 1. P. 54–59.
- *Bobriakov A.V.* Methods perfection for sectoral energy consumption and energy saving in budget area // Proc. of 2nd Intern. conf. «Modern energy saving heat technologies (drying and heat processes) SETT–2005» : VIM Publisher, 2005. P. 25–30.
- *Bobriakov A.V., Vorob'iov A.S., Manchkha C.P., Makal'skiy L.M.* Creation of information-analytical system «Monitoring of budget sector» // Ibid. P. 26–31.
- *Agababov V.C., Arkharova A.Yu.* Influence of expander-generating aggregate on the variation of HTTP heat efficiency at double-stage gas heating // Energosberezhenie i vodopodgotovka. 2005. No 4 (36). P. 67–68.
- *Koriagin A.B.* Operation effectiveness increase of steam-gas units at expander-generating aggregates usage // MPEI Vestnik. 2005. N 5. C. 63–71.
- *Ilyakhin N.V., Agababov V.S.* Perspectives of expander-generating aggregate applications in gas supply systems // Gasovaya promyshlennost. 2006. No 2. P. 70–72.
- *Zlobin A.A., Kuriatov V.N., Mal'tsev A.P., Romanov G.L.* Aims and tasks energy inspections under condition of state economic management structures reforming // Energomenedzher. 2005. No. 32. P. 28–33.
- *Kuriatov V.N., Mal'tsev A.P., Zlobin A.A., Romanov G.L.* Energy saving potential and its practical implementation // Glavny energetik. 2006. No 1. P. 85–88.
- *Checking-signaling* complexes providing the enterprise functioning reliability / L.M. Makal'skiy, A.B. Bogatyriov, P.K. Makarychev // Nediozhnosnt. 2005. No 5. P. 34–41.
- *Bobriakov A.V., Danilov O.L., Tikhonova E.A.* Technique for checking energy inspection execution in budget economic area by thermal imaging // Proc. of Intern. conf. «Modern information technologies». Penza: Penza State Technological Academy Publisher, 2006. No. 3. P. 11–14.
- *Gribkov S.V.* Russia wind energy installations in autonomous energy complexes of guaranteed supply // Proc. of III Intern. conf. «Renewable and small energetic–2006»: 2006. P. 124–129.

■ Partners

- Federal Education agency:
- Accounting and Financial Control Division
- Division of Federal Property and Material-Technical Base Development
- TEK Department of Minpromenergo of RF, Moscow
- Material-Technical Supplying Division of Minobrazovanie of RF, Moscow
- Energy Managers Association of Russia
- Ministry of railways of Russia, Moscow
- «Gspromenergo» company, Moscow

■ **Unique equipment**

- Measuring-calculation complexes and devices set for fulfillment of measuring inspections of communal services and industrial enterprises objects
- Combined equipment for execution of energy and ecology inspections and energy audit including the determination on consuming power, electric energy quality, flow-measuring devices, concentration meters for CO, CO₂, SO₈, NO_x, O₂, benzopyren etc.
- Software-technical complex for information-analytical system for educational institutions including software-methodic support

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GEPL:
7 researchers.

Head of Lab
Doctor of technical sciences,
Professor Vladimir V. KLIMENKO

■ **Main Lines of Research**

- Study of world energy development regularities: energy consumption evolution, fuel mix variation, resource basis, influence on atmosphere and climate
- Investigations of Russian energy development perspectives: greenhouse gases and pollutants emission estimation, possibilities of Kyoto protocol obligations fulfillment and economical mechanisms usage potential, expected climate change influence on power industry
- Ecological aspects studying for human being various branch development, particularly, nature saving technologies evolution at production and consumption of various energy forms
- Anthropogenic influence studying on the atmosphere: reconstruction of the main time series for main greenhouse gases and wastes emission in various branches of world and Russian economy, scenario development of the possible human influence on chemical and radiation-heat atmosphere balance, possibility investigation of possible reduction ways of the similar negative influence
- Climate variation modeling and forecasting at global and regional level, in particular, anthropogenic contribution extraction into main climate characteristic evolution
- Studying of feedback in the system «person-climate»: general estimation of possible climate variation consequences for various human activity areas, process studying in specific branches of economy (in electrical power engineering, in heat-supply systems, on nuclear power plant objects. In constructive industry); new approaches development for negative consequence minimization from the expected variations of environment and climate for economy of Russia
- Past climate investigations and its variation connection with the civilization evolution: paleoenvironmental research (past climate reconstruction with the help of palinologic, dendrochronological and other approaches), historical climatology (past climate reconstruction on the basis of historical documents studying)

■ **Agreements, contracts, projects supported by the state budget**

- Development of scientific bases for energy development forecasting with account of climate and demography factors action
- Method system development for medium- and long-term energy supply planning with account of nature-climate conditions variations
- Creation of scientific-methodic basis and information base for investigation in area of nature environment and energetic interaction in Russian Federation.
- Investigation of nature-climate and social-economic factors influence on the heat consumption of Russian regions

- Energetic and expected climate variations. Petrochemical complex of Russia under conditions of new Arctic warming
- Development of scientific basis for Russia heat supply in the context of Kioto protocol action
- Fundamental problems Investigation for Russia energetic development in the context of international regulations in area of atmosphere and climate protection
- Scientific-technical basis creation for innovation Russian energetic development in the context of Kyoto protocol implementation mechanisms
- Informational-methodic support of heat supply planning provision under conditions of nature-climate variations
- Decision making support system at Russian energetic development planning under conditions of global climate changing
- Modeling and forecasting of climate regional variations for tariff calculation by energy supplying enterprises in Moscow region
- Dynamics and production and consumption structure investigation for heat energy in Moscow and Moscow region

■ Key publications

- *Evolution* of Russian Mentality / Kulpin E.S., Klimenko V.V., Pantin V.I. et al. // «Social-Natural History / Genesis of Nature and Social Crisis in Russia» (edited by E. Kulpin). Vol. XXVI. Moscow, Energia Publ. 2005. 188 p.
- *Klimenko V.V. and Tereshin A.G.* World Energy Generation and Global Climate in the 21st Century in the Context of Historical Trends. Thermal Engineering, 2005, Vol. 52, No. 4, P. 262–266.
- *Klimenko V.V., Mikushina O.V.* History and Projection of Climate Change in the Barents and Kara Seas // Geoecology. 2005. No. 1. P. 43–49.
- *Pavlov A.V., Khrustalev L.N., Mikushina O.V.* Prediction of Air and Ground Temperature for Assessing Safety of Permafrost Basements of Engineering Structures // Geoecology. 2005. No. 3. P. 219–226.
- *Sleptsov A.M. and Klimenko V.V.* A Generalization of Palaeoclimatic Data and Climate Reconstruction of Eastern Europe for the Last 2,000 Years. History and Modernity. 2005, No. 1. P. 118–135.
- *Modeling* of climate change and permafrost dynamics for the safety of buildings / Klimenko V.V., Mikushina O.V., Tereshin A.G. et al. // Proc. of the Conference 'Municipal Construction Complex and Safety of People». Moscow State University of Construction Publisher, 2005. P. 44–51.
- *Climate* Forecasting for the Construction Complex / Tereshin A.G., Mikushina O.V., Beznosova D.S. et al. // Ibid. P. 74–82.
- *Astrina N.A., Dahlmann D. and Klimenko V.V.* Climate Fluctuations in the Western Sector of the Russian Arctic in the XVI–XXth Centuries According to Historical Sources and Modeling Data // MPEI Bulletin, 2005. No. 3. P. 124–133.
- *Klimenko V.V., Astrina N.A. and Dahlmann D.* Historical Evidence of Strong Climate Fluctuations in the Western Arctic during the Past 500 Years. In: Nature and Society in the Globalizing World (edited by E. Kulpin). Moscow, The Institute of Oriental Studies of the Russian Academy of Science, 2005, P. 31–55.
- *Klimenko V.V., Beznosova D.S. and Tereshin A.G.* Does the Kyoto Protocol Have a Future? // Thermal Engineering, 2006, Vol. 53, No. 5, P. 335–342.
- *Klimenko V.V. and Astrina N.A.* Documentary Evidence of Strong Climate Variations of the Russian Arctic in the XV–XXth Centuries // History and Modernity. 2006. No. 1. P. 179–218.

- *Klimenko V.V., Tereshin A.G.* World Energy and Global Climate in the 21st Century // Proc. National. Symp. on Thermal Power Engineering. (edited by Y.G. Nazmiev, V.N. Shlyannikov). Kazan, Russia. 2006. Vol. 2. P. 255—258.
- *Tereshin A.G., Klimenko V.V., and Beznosova D.S.* Russian Power Industry and Kyoto Protocol // Ibid. P. 277—280.

■ Dissertations

- *Beznosova D.S.* Dynamics of heat and energy consumption forecasting under influence of climate variations and greenhouse gases emission estimate: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Geology Faculty of Lomonosov Moscow State University, Moscow Geography Faculty of Lomonosov Moscow State University, Moscow Historical Faculty of Lomonosov Moscow State University
- Moscow Geoecology Institute RAS, Moscow
- Energy Strategy Institute, Moscow
- Moscow car-road institute (state technical university)
- Westphalian University, Münster, Germany
- Rhein University, Bonn, Germany
- Alexander von Humboldt Foundation, Bonn, Germany

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At MPERS:
4 researchers,
5 engineers.

Head of MPERS
Senior researcher, Ph.D. Boris F. REUTOV

■ Main Lines of Research

Research Supervisor

- **Development of scientific-methodic basis of energy savings control including the development of formation principles of federal, regional and municipal energy saving programs, of creation and implementation principles for normative-lawful, organizational-financial and technological policy in energy saving area**

Senior researcher Reutov B.F.

- **Scientific-methodic investigations and informational-analytical system for native developments, technologies and materials demonstration in area of energy saving control with the usage of modern informational technologies**

Antropov A.P.

- **Development of scientific-methodical basis for implementation of the energy-effective projects with usage of Kioto protocol mechanisms with the aid of global climate changing consequences softening**

Ph.D. Pyzhov I.N.

- **Fulfillment of R&D projects on studying the application principles of ecologically pure substances and materials in modern energy-effective equipment**

Associated-Professor Ustiuzhanin E.E.

■ Agreements, contracts, projects supported by the state budget

- Development of institutional stimulating system for energy savings during the energy resources production and consumption process in Russia Federation territory
- Scientific-organizational, methodic and technical provision of Research-Academic Centers organization and support in area of new and renewable energy sources and joint research and development realization on the basis of combined usage of material-technical and cadre possibilities
- Action support, analytical report and review preparation in the limits of Russian Federation activity support in international co-operations. Support of national contact point «Sustainable development, global changing, ecosystems (stable energy systems)» in the limits of 6th EU frame Program
- Investigation and development of high-effective equipment for the heat pump project on CO₂ for operation on MPEI HEPP 8 kW in power
- Raw processing intensification by polar solvent in sub- and supercritical conditions

■ Key publications

- *Ustiuzhanin E.E., Rykov V.A., Popov P.V., Reutov B.F.* Standard reference data tables. Khladon R 236ea. Thermodynamical properties on boiling and condensation lines in temperature range 220.00412.45 K. GSSSD 191 – 05, Protocol No 2 dated 25.05.05. Deposited by FSUE Standartinform No 25-05 ik, 2.07.05 (2005)

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- *Rykov V.A., Ustiuzhanin E.E., Popov P.V., Kudryavtseva I.V., Rykov S.V.* Khladon R 218. Density, enthalpy, entropy, isobar and isochoric heat capacity, sound velocity in temperature range 170...470 K and pressure range 0.001...70 MPa. GSSSD 211–05. Deposited by FSUE Standartinform No 35-05 ik, 21.10.05 (2005)
 - *Rykov V.A., Ustiuzhanin E.E., Popov P.V., Kudryavtseva I.V., Rykov S.V.* Khladon R 23. Density, enthalpy, entropy, isobar and isochoric heat capacity, sound velocity in temperature range 235...460 K and pressure range 0.01...25 MPa. GSSSD 214–06. Deposited by FSUE Standartinform No 25-05 ik, 23.05.06 (2006).
 - *Ustiuzhanin E.E., Popov P.V., Rykov V.A.* Calculation technique for thermodynamic properties of refrigeration medium R 134a, R 143a and R 236ea on saturation line including critical region. GSSSD 264–06, Deposited by FSUE Standartinform No 27-05 mr, 20.10.06 (2006).

INSTITUTE OF ELECTRICAL ENGINEERING (IEE)

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**Institute
departments**

- **Electromechanics department (EM)**
- **Physics of Electromaterials and Automation of Electrical-Technology Complexes (EMCAETC) department**
- **Electrotechnical Complexes of Self-Contained Objects (ECSCO) department**
- **Electrical and Electronic Apparatuses department (EEA)**
- **Ecology Engineering and Protection of Labor department (EEPL)**
- **Engineering Management department (IM)**
- **Automated Electric Drive department (AED)**
- **Electric Transport department (ET)**
- **Power Supply of Industrial Enterprises department (PSIE)**

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At EM department:
 27 teachers,
 5 researchers,
 10 Ph.D. students.

Head of department Ph. D. (Techn.),
 Associated-Professor Sergey V. Shirinskiy

■ Main Lines of Research

Research Supervisor

- **Development and creation of high-effective electrical AC motors**
 Professor Ivanov-Smolenskiy A.V.
- **Development of mathematical models and calculation methods for electro-mechanical energy converters**
 Professor Kopylov I.P.
- **Development of calculation and design methods of electrical motors for dynamic operation mode**
 Professor Bespalov V.Ya.
- **Development and creation of regulated electrical motors with wide regulation range**
 Professor Kuznetsov V.A.
- **Calculation methods development for electric motor of small power**
 Associated-Professor Semenchukov G.A.
- **Development and investigation of non-traditional electric energy sources**
 Associated-Professor Kotelenets N.F.
- **Reliability analysis for electric motors and recommendation development on its growth**
 Associated-Professor Kuznetsov N.L.
- **Development of fast-acting voltage regulators of large power on the basis of thyristor-transformer circuits**
 Associated-Professor Korobkov S.A.
- **Development of ultra-fast calculation methods for electric motors with semiconductor converters with account of its interference**
 Associated-Professor Shirinskiy S.V.

■ Agreements, contracts, projects supported by the state budget

- Development of calculation methods and design bases for special electromechanical converters
- Confrontation of different calculation methods for ponderomotive forces in non-linear magnetic characteristics medium for magnetization
- Technical-economic substantiation development for the standard documentation application on exploitation of gate-inductor motors in mechanism drives for inherent needs
- Creation of high-reliable generators and electric motors for power engineering
- Creation of single-phase asynchronous motors with improved energy indexes
- Investigation of electromagnetic processes in asynchronous gated generator with massive rotor for diesel locomotive energy supply
- Development of resource-saving electromechanical devices
- Development of AC electronic inductor motors

- Investigation of voltage regulator pre-production model characteristics

■ Key publications

- *Bespalov V.Ya., Kotelenets N.F.* Electric machines: «Academia» Publisher, 2006. 320 p.
- *Osin I.L.* Synchronous electric motors of small power: MPEI Publishing House, 2006. 211 p.
- *Kuznetsov N.L.* Reliability of electric machines: MPEI Publishing House, 2006. 432 p.
- *Bushuev V.V., Kopylov I.P.* Cosmos and Earth. Electromechanic interactions. IAC «Energia» Publisher. 2005. 176 p.
- *Ivanov-Smolenskiy A.V.* Electric machines. In 2 vol.— 2nd edition, revised and supplemented: MPEI Publishing House, 2005. V. 2. 528 p.
- *Kopylov I.P.* Electric machines. — 5th edition. Vyschaya shkola Publisher. 2006.
- *Kopylov I.P., Klokov B.K., Morozkin V.P., Tokarev B.F.* Electric machine design. — 4th edition / under editing of I.P. Kopylov: Vyschaya shkola Publisher. 2005.
- *Kopylov I.P.* Space electromechanics. — 3rd edition: Vyschaya shkola Publisher. 2005.
- *Izvekov V.I., Serikhin N.A., Abramov A.I.* Turbogenerator design: MPEI Publishing House, 2005. 440 p.
- *Kopylov I.P.* Energy crisis and pure water deficit // Elektrotehnika. No 1. 2005.
- *Kopylov I.P.* Cyclone fuel elements — the main source of fresh water // Izvestia RAS. Series Energetika. 2005. № 2.
- *Bespalov V.Ya., Belassel' M.T., Shetat Bukhemis.* Capacitance parameters and overvoltages in asynchronous motor winding supplied from the pulse-duration modulation converter // Elektrotehnika. 2005. No 1. P. 44—48.
- *Bespalov V.Ya., Belassel' M.T.* Wave parameters and overvoltages in various winding types of asynchronous motors supplied from pulse-duration modulation converters // Elektrotehnika. 2006. No 3. P. 56—63.
- *Ivanov-Smolenskiy A.V., Kuznetsov V.A.* Magnetic field calculation method with account of 3D heterogeneity of electric machine cores // Elektrichestvo. 2005. No 11. P. 2—7.
- *Lopukhina E.M., Semenchukov G.A.* Algorithm and software for the additional moment calculation in single-phase asynchronous motors // Izvestia vuzov. Electromekhanika. 2005. No 2. P. 21—23.

■ Patents

- *Patent 2277285 RF.* Section of AC electronic inductive motor and multi-section AC electronic inductive motor / V.G. Fisenko, A.M. Rusakov. 2006.

■ Partners

- «Pskovelektromash» company, Pskov
- «Electrosila» company, Sankt-Peterburg
- All-Russia R&D design-technological Institute of electric machine industry, Vladimir
- Yaroslavl' Electromechanical Plant, Yaroslavl'
- «Krosna-motor» company, Moscow
- «Ford Motor Company, Detroit, USA
- Компания «Olton Drives» company, Leeds, UK
- «Holeck» company, Rodderkerk, The Netherlands

- ❑ Technical University of Eindhoven, The Netherlands
- ❑ Norway University of Science and Technology, Trondheim, Norway
- ❑ Technical university of Sofia, Bulgaria
- ❑ University of Wisconsin-Madison, Madison, USA
- ❑ University of Calgary, Calgary, Canada
- ❑ Colorado University at Denver, Denver, USA
- ❑ University of de Valle, Cali, Colombia
- ❑ University of Puantarene, Chile
- ❑ Tsinghua University, Beijing, China
- ❑ North-China technical university, Beijing, China
- ❑ «Dong Fang» Plant, China
- ❑ University of Lille, France



PHYSICS OF ELECTROMATERIALS AND AUTOMATION OF ELECTRICAL-TECHNOLOGICAL COMPLEXES DEPARTMENT (EMCAETC)

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27 teachers,

4 researchers,

26 Ph.D. students.

Head of Department

Doctor of technical sciences,

Professor Sergey V. SEREBRIANNIKOV

■ Main Lines of Research

Research Supervisor

- **Radio absorbing materials and coverings implementation**
Professor Serevriannikov S.V., Professor Cheparin V.P.
- **Creation and investigation of heterogeneous composite electrical materials with extreme properties**
Professor Filikov V.A.
- **Development of bio-compatible materials for application in medicine**
Professor Arsen'ev P.A.
- **Development of nano-materials and materials for hydrogen energetic**
Professor Arsen'ev P.A.
- **Equipment and technologies development for synthesis of new high-temperature oxide materials**
Professor Balbashov A.M.
- **Equipment development for induction low-temperature heating**
Professor Kovaldin A.B.
- **Development of control systems for electrical technological installations on the basis of computer and microprocessor technique**
Professor Rubtsov V.P.
- **Development of principally new electric technological processes for pure and composite materials production, covering infliction, ecology problems solution etc.**
Professor Rubtsov V.P.
- **Equipment investigation and development for ion-plasma materials processing**
Professor Dolbin E.V.
- **Development and perfection of controlled power supply sources for electric technological installations**
Associated-Professor Peshekhonov V.I.
- **Construction and manufacturing technologies optimization for communication cables**
Associated-Professor Riazanov I.B.
- **Development of web-applications and e-learning complexes for distant education**
Associated-Professor Sutchenkov A.A., senior researcher Tikhonov A.I.

■ Agreements, contracts, projects supported by the state budget

- Radio absorbing coverings creation

- Synthesis, physical-chemical investigations of new electric and radio materials and its technology application in special products
- Investigation and development of new special materials for electrical and electric power engineering units
- Development of technological equipment for crucibleless zone melting with radiation heating
- Development of high-Q electrical ceramics
- Educational-methodic complexes on material science
- Investigation and optimization of controlled power supply sources for plasmatron
- Investigation of electric technological processes influence on environment and decreasing of its negative effects
- Investigations of operating modes of inductive technological installations
- Investigation of vacuum infliction of conductive coverings
- Development of automatic control systems for covering infliction installations
- Development of modernized control systems for vacuum arc furnace

■ Key publications

- *Kuvaldin A.B., Lepioshkin A.R.* High speed modes on induction heating and thermal tension in details. Novosibirsk. NGTU Publisher, 2006. 284 p. (Modern technologies. V. 7)
- *Fundamentals* of cable technique / V.M. Leonov, I.B. Peshkov, I.B. Riazanov, S.D. Kholodny; under edition of I.B. Peshkov: «Academia» Publisher, 2006. 432 p.
- *Kustov E.F.* Analytical economics. Tambov, Pershins Publisher , V. 1. 2005. 399 p.
- *Boiko F.K., Kuvaldin A.B., Ptitsuna E.V.* Electrolysis electric technological installation with power supply by current of complex form. Pavlodar: NIC PGU Publisher, 2005. 83 p.
- *Krouchinin A.M., Sawicki A.* Modelling of the Constricted Arc in Plasma Generators. Seria Monografie Nr 109, Czestochova University of technology, 2005. 223 p.
- *Kuvaldin A.B., Strupinskiy M.L., Kyrenkov N.N., Shatov V.A.* Electrothermal model of coaxial inductive-resistive heating system // Elektrotehnika. 2005. No 1. P. 48—53.
- *Dambis M.K., Filikov V.A., Dolgov A.B.* Microstructure of alloyed microwave dielectrics on the basis of barium titanates // Proc. of XI Intern. conf. of students. In 3 vol. «Radio-electronics, Electrical and Power Engineering». 2005. V. 2. P. 47—48.
- *Composite* Magnetic Coverings Absorbing Electromagnetic Waves in Radio Electronic Systems / S.V. Serebryannikov, N.V. Stepanov, V.P. Cheparin et. al. // Intern. Conf. «Functional materials» Ukraine, Crimea, 2005. P. 220.
- *Serebryannikov S.V., Kitaitsev A.A., Cheparin V.P., Eremtsova L.L.* Study of Electromagnetic Wave Energy Absorption in Composite Media Based on «Ferrite-Graphite» mixture // Ibid. P. 221.
- *Microstructure* of radio ceramics with various alloyed dopes / N.D. Vasil'eva, M.K. Dambis, V.A. Filikov etc. // Proc. of XIV Russian symp. on raster electronic microscopy and analytical research methods of solid bodies. Chernogolovka, 2005. P. 95.
- *Evseev A.I., Maslov S.I., Ochkov V.F., Serebriannikov S.V.* Electronic resources of engineering education. Education environment at present and to-morrow // Proc. of III All-Russia conf.: Rosobrazovanie Publisher, 2006. P. 213—218.
- *Maslov S.I., Serebriannikov S.V., Tikhonov A.I.* Resources and technologies of engineering education informatization // Proc. of IV anual conf. of State Management Faculty of Lomonosov MSU «State Management in XXI century: traditions, innovations, 2006. P. 48—53.

■ Patents

- *Patent 2257017 RF.* Induction device for heating and agitation of liquid medium / A.B. Kuvadin, A.N. Kachanov, N.A. Kachanov // Bl. 2005. No 20.

■ Partners

- Electronic Institute of Bulgarian Academy of Sciences, Sofia, Bulgaria
- Chentokhova Polytecnic University, Poland
- Ilmenau Technical University, Germany
- Taiyuan Technology University, China
- Army Medical Academy of Russia Ministry of Defense, Sankt-Peterburg
- «All-Russia R&D Institute of electric-thermal equipment», Moscow

■ Unique equipment

- Equipment for synthesis of high-temperature oxide compounds by optical zone melting method
- Equipment for thermographic and microcalorimetry analysis
- Induction heating installation using inductor cryogenic cooling
- Electron-beam installation for refractory material melting
- Vacuum high-temperature electric resistive furnace
- E-learning complex on electrical engineering material sciences including electronic text-book, virtual laboratory, facilities for knowledge testing, administration system



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15 teachers,

10 researchers,

7 Ph.D. students.

Head of department

Doctor of technical sciences,

Professor, Winner of RF President Award

Sergey I. MASLOV

■ Main Lines of Research

Research Supervisor

- **Electric supply systems for autonomous objects and secondary power supply sources**

Professor Eriomenko V.G., senior researcher Aparov A.B.

- **Research automation of electromechanical and electrical systems with usage of modern information-communication technologies**

Professor Maslov S.I., senior researcher Arbutov Yu.B.

- **Electric drives of wide application on the basis of hysteresis-reluctance motors**

Professor Tarasov V.N.

- **Little distorting electronic converters and electronic energy systems on its basis**

Senior Researcher Myzyk G.S.

- **Electromechanical systems on the basis of inductor machines and synchronous machines with excitation from the permanent magnets**

Senior researcher Rusakov A.M.

■ Agreements, contracts, projects supported by the state budget

- Research and development of information and communication system for automated remote laboratory practicum on fundamentals of electrical engineering and electronics
- Development and implementation of combined system for individual practical training in area of natural sciences, engineering and technology on the basis of distributed network of special laboratory equipment with remote access for the continuous professional education
- Development of research methods and facilities for design of AC electronic systems on the base of inductor electromechanical converters and synchronous machines with excitation from the permanent magnets
- Development of electric drives for oil-producing equipment, microcryogenic systems, compressors for refrigerating plants, power pumps for TPP, urban transport
- Development of generators for autonomous energy systems: wind-, hydro-, diesel-generators and generators operating on the network
- Development of autonomous electric power supply systems for space apparatuses
- Development of electronic devices and systems including military purpose systems
- Lighting engineering pulse and low-voltage high-current power sources
- Electric supply systems for distributed power pulse load
- Non-contact systems for charging miniature rechargeable batteries

- Development of electromechanical systems on the basis of hysteretic motors for textile, chemical and nuclear industry and gyroscopic systems

■ Key publications

- *Electric* equipment of flying vehicles: textbook for universities in 2 vol. / S.A. Gruzkov, C.Yu. Ostanin, A.M. Sugrobov etc. V. 1. Electric supply systems for flying vehicles: MPEI Publishing House, 2005. 568 p.
- *Engineering* education informatization: Electronic educational resources of MPEI / under edition of S.I. Maslov: MPEI Council on distant education, 2005. 160 p.
- *Tarasov V.N.* Development of new types of mechatronic devices for rotor and centrifuge technologies realizations // *Makhanotronics, automation and control*. 2005. No 4. P. 38–45.
- *Tarasov V.N.* Methods and technical facilities of error components dividing for the buoyant-element gyro-devices caused by electric drive. // *Gyroscopy and navigation*. 2005. No 3. P. 59–67.
- *Modeling* of the pulse source of secondary power supply / V.G. Eremenko, N.B. Zhirnova, G.L. Lipkin etc.// *Prakticheskaya silovaya elektronika*. 2005. No 17. P. 12–19.
- *Koniakhin C.F., Mikheev V.V., Myzyk G.S., Tsishevskiy V.A.* On the new possibility of technical parameters improvement for three-phase transformer-rectifier devices with improved electromagnetic compatibility. *Electric supply: papers collection // Association of developers, manufacturers and consumers of electric supply facilities*. Sankt-Peterburg. 2005. P. 45–57.
- *Myzyk G.S., Mikheev V.V., Tarasov V.N.* Application of Multi-channel energy flow conversion concept for synthesis of electronic AC power supply systems // *Prakticheskaya silovaya elektronika*. 2005. No 17. P. 20–26.
- *Gruzkov D.S., Berilov A.V.* Universal multi-channel frequency and voltage converter with remote control for execution of research and practical works on power electronics // *Ibid*. P. 34–37.
- *Kozachenko V.F., Korpusov D.E., Ostrirov V.N., Rusakov A.M.* Electric drive on the basis of the inductor AC electronic machines with electromagnetic excitation // *Electronic components*. 2005. No 6. P. 60–67.
- *Ostrirov V.N., Kozachenko V.F., Rusakov A.M., Korpusov D.E.* Electric drive on the basis of inductor motor with electromagnetic excitation // *Vestnik of National technical University «Kharkovskiy politekhnicheskiiy institut»*. Series «Electrical Engineering, electronics, electric drive». No 45: papers collection. Khar'kov, 2005. P. 525–527.
- *Duplicated* Internet-Lab «Electronics bases» // *Proc. of III All-Russia conf. «Educational environment: at present and tomorrow» / S.I. Maslov, Yu.V. Arbuzov, A.V. Berillov etc.; responsible editor V.I. Soldatkin: Rosobrazovanie Publisher, 2006. P. 43–47.*
- *Maslov S.I., Serebriannikov S.V., Tikhonov A.I.* Engineering education informatization resources and technologies // *Proc. of IV annual Intern. conf. of state management faculty of Lomonosov Moscow State University «State management in the XXI century: traditions and innovations: 2006. P. 48–53.*

■ Patents

- *Patent 2247466 RF.* Double-channel three-phase inverter / G.S. Myzyk, V.V. Mikheev. 2005.
- *Patent 2248660 RF.* Power supply system for hysteresis motors / V.V. Mikheev, G.S. Myzyk, V.N. Tarasov. 2005.

- *Patent 2249908 RF.* Power supply system for hysteresis motors / V.V. Mikheev, G.S. Myzyk, V.N. Tarasov. 2005.
- *Patent 44900 RF.* Three-phase transformer-rectifier device with double-channel transformation / G.S. Myzyk, V.V. Mikheev, S.F. Koniakhin, V.A. Tsishevskiy. 2005.
- *Patent 44211 RF.* Three-phase transformer-rectifier device with double-channel transformation (variants) / G.S. Myzyk, V.V. Mikheev, S.F. Koniakhin, V.A. Tsishevskiy. 2005.
- *Patent 2264022 RF.* Magnetic rotor system and its manufacturing method (magnets location with length displacement) / A.M. Rusakov etc. 2005.
- *Patent 2277284 RF.* Non contact inductor AC electronic electric machine with electromagnetic excitation / A.M. Rusakov, I.A. Zherdev, V.F. Kazachenko, V.N.Ostirov. 2006.
- *Patent 2277285 RF.* Section of AC electronic inductor electric motor and multi-section AC electronic electric motor / A.M. Rusakov, V.G. Fesenko. 2006.

■ Partners

- Izhevsk State Technical university, Izhevsk
- Kyrgyz State Technical university, Bishkek (Kirghizia)
- Krasnoyarsk State Technical university, Krasnoyarsk
- Moscow Aviation Institute (technical university), Moscow
- Bauman Moscow State Technical University, Moscow
- «Aeroelectromash» company, Moscow
- Ural electrochemical plant, Novoural'sk
- «Russian innovation fuel-energy company», Moscow
- «Development Center for oil-producing equipment» company, Moscow
- «Safonov electromachinery plant» company, Safonovo, Smolensk region.
- «Sarapul electro-generator plant» company, Sarapul, Ural
- «Electromash» company, Tiraspol, Moldova
- «Energy» company, Grodno, Belarus
- «Aviation electronics and communication systems» company, Moscow
- R&D Center «CENTERTECH-ECH3», Sankt-Peterburg
- «Electro-chemical plant» company, N. Novgorod
- State Unitary Enterprise «Golovnoe konstruktorskoe buro Projector», Moscow
- «Yakor'» company, Moscow
- Federal State Unitary Enterprise «NPO Mashinostroenie», Reutov, Moscow region

■ Unique equipment

- Equipment for polytechnic Internet-lab «Electrical engineering and electronics bases»

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At EEA department:
20 teachers,
24 researchers,
12 Ph.D. students.

Head of department
Ph.D., Associated-Professor
Maksim V. RYABCHITSKIY

■ Main Lines of Research

- Research Supervisor
- **Investigation and development of multi-functional contact-semiconductor apparatuses for commutation, protection and control**
Professor Rosanov Yu.K.
 - **Investigation and development of power regulators for electric energy quality for electric supply systems**
Professor Rosanov Yu.K., associated-professor Ryabchitskiy M.V.
 - **Investigation and development of systems with electromechanical and power electronic control apparatuses on the basis of microprocessors and microelectronic means**
Ph. D. (Techn) Kvasniuk A.A.
 - **Calculation methods development for electromagnetic systems**
Professor Shoffa V.N., senior researcher Kurnbatov P.A.
 - **Investigation and development of electromagnetic DC and AC systems for oil and gas condensate extraction intensification**
Senior researcher Kurnbatov P.A.
 - **Fundamental investigations of physical phenomena and development of systems with liquid-metal composite materials**
Professor Degtiar' V.G.
 - **Investigation of artificial intellect systems for electric apparatuses choice and its reliability estimation**
Professor Godzhello A.G., Kalashnikova A.V.
 - **Investigation and development of secondary power supply sources on the basis of fast-acting magnetic gates**
Associated-professor Khruslov L.L.

■ Agreements, contracts, projects supported by the state budget

- Development of principles and control theory bases for electric energy flows commutation by the modern power electronics facilities
- Investigation and development of structural principles for module systems of autonomous power supply of special complexes
- Certification testing execution in area of electromechanical apparatuses, semiconductor converters and uninterrupted supply aggregates
- Artificial intellect system object-oriented on electric apparatuses choice and interacted with appropriate database
- Theory and manufacture technology development for liquid-metal contact units providing increased reliability, material consumption and electric installation energy consumption reduction

- Theoretical regulation methods bases development for electric energy quality and creation of active and hybrid filters for flexible AC electric transfer lines and active power filters-regulators on the basis of power electronics elements
- Development of submersible porous electromagnetic devices for complex acoustic and magnetic influence on working zone of oil layer
- Development of analysis and design methods for electromagnetic and vibration apparatuses for oil and gas condensate extraction intensification

■ Key publications

- *Baranov N.N., Glimovskiy I.I.* Cellular communication: energy problems // Preprint of OIVT RAS, 2005. 30 p.
- *Alfiorov D.F., Belkin G.S.* Fast-acting vacuum apparatuses with controlled commutation // Proc. of VIII Symp. «Electrotekhika – 2010». Moscow region. 24–26 of May, 2005. P. 62–63.
- *Belkin G.S.* Application of self-controlled apparatuses (apparatuses having «intellect») for high-voltage circuits commutation // Elektrotehnika. 2005. No 12.
- *A comparison of* Losses in Small (<1kW) Drives Using Sine and Space Vector Pulse Width Modulation Schemes / C.Y. Leong, R. Grinberg, G. Makrides et. al. // Power Electronics, Drives and Systems Conf. PEDS'2005, Kuala Lumpur, Malaysia, 2005. P. 316–321.
- *Grinberg R., Palmer P.R.* Advanced DC link Capacitor Technology Application for a Stiff Voltage-Source Inverter // IEEE Vehicle Power and Propulsion Conf. VPPC'2005 Proceedings, Chicago, USA, 2005 P. 205–210.
- *Kurbatov P.A., Osipkin S.V.* Electromagnetic forces in moving periodic structures with permanent magnets // Proc. of XV Intern. conf. on permanent magnets. Souzdał'. 2005.
- *Rosanov Yu.K., Ryabchitskiy M.V., Kvasniuk A.A., Smirnov M.I.* Physical modeling of static compensator of reactive power // Elektrotehnika. 2005. No 5. P. 35–36.
- *Ryabchitskiy M.V., Rosanov Yu.K., Smirnov M.I.* Digital control system for non-active power converters // Proc. of Intern. conf. «Power electronics and energy effectiveness 2005». Ukraine, Alushta.
- *Shoffa V.N., Cicerjukin V.N., Miedzinski B, Wisnewski G.* Improved Performance of a Changeover Reed Switch When Polarized // Proc. of the Relay and Switch Technology 53rd Conf. USA. 2005.
- *Belkin G.S.* Heat processes in electric apparatuses: «Znak» Publisher, 2006. 224 p.
- *Promising* types of electric equipment / G.S. Belkin, A.A. Drobyshevskiy, V.N. Ivakin etc. // Elektrotehnika. 2006. No 69. P. 2–9.
- *Belkin G.S.* Development perspectives of high-voltage commutation equipment // Elektrichestvo. 2006. No 9. P. 15–20.
- *New systems* for electric equipment protection against overvoltage and current overload / D.F. Alfiorov, G.S. Belkin, V.N. Ivakin etc. // Elektrotehnika. 2006. No 9. P. 21–26.
- *Rosanov Yu.K., Koshelev K.S., Smirnov M.I.* Digital control system for static compensator of reactive power // Elektrichestvo. 2006. No 7. P. 25–30.
- *Rosanov Yu.K., Smirnov M.I.* Starting-regulation device on the basis of active filter // Tekhnicheskaya elektrodinamika: Silovaya elektronika i energoeffektivnost. Kiev, 2006. V. 4. P. 16–17.
- *Koshelev K.S., Smirnov M.I.* Controlling of static compensator for reactive power. // Ibid. V. 4. P. 60–61.

- *Rosanov Yu.K., Ryabchitskiy M.V., Sazonov V.V.* Universal electric energy conditioner // Ibid. V. 5. P. 58—59.
- *Rosanov Yu.K., Mamedov T.T.* Current regulator for aerodrome light-signal equipment // Ibid. V. 5. P. 60—61.
- *Rosanov Yu.K., Ryabchitskiy M.V., Sazonov V.V.* AC filter-regulator with ABP functions // Stroji-profil'. 2006. No 4(50). P. 112—113.
- *Ryabchitskiy M.V., Kalashnikov A.V.* Certification of low-voltage complete devices // Stroji-profil'. 2006. No 2 (1).
- *Shoffa V.N., Karabanov S.M., Myzel's R.M.* Hermetical contacts and hermetical technique in Russia // Elektricheskie kontakty i elektrody. Kiev, Institute of material science problems of National Academy of Sciences, Ukraine, 2006.
- *Shoffa V.N., Miedzinski B., Okraszewski Z.* Kontaktorny — electromec — Gornictwa mechanizacja I automaty-haniczne stykowe elementy zacja. 2006. № 8 (427). Polaad, Katowice, automatyki.

■ Partners

- «Pskovelektromash» company, Pskov
- «All-Russian R&D Institute of Electromechanics» company, Moscow
- State Center «Andreev Acoustical Institute», Moscow
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin», Moscow
- R&D enterprise «INELS», Moscow
- Engineering-industrial Consortium «Intellectual power electronics», Moscow
- Small state R&D enterprise «ELOKR», Moscow
- Science-technological Committee of strategic purpose missile forces of Defense Ministry, Moscow
- Military Engineering Academy of strategic purpose missile forces named after Peter The Great, Moscow
- State Unitary Enterprise «Golovnoe komstruktorskoe Buro Projector», Moscow
- ABB «Semiconductor», Moscow
- Siemens T.O. «Intex», Moscow
- RIA «Sapphire», Moscow
- «Energoservis» company, Moscow
- RIA «Elektroprivod», Moscow
- «Tavrida-Elektrik» company, Moscow
- All-Russia R&D Institute of Releastroenia, Cheboksary
- United Institute of high temperatures, RAS, Moscow
- «R&D Institute of Electrical Power Engineering», Moscow
- «Federal net company of united energy system, Moscow

■ Unique equipment

- Hole acoustical installations for oil and gas condensate producing intensification
- Vacuum testing setup for electrical apparatuses up to 5 kA
- Equipment set for electrical apparatuses testing under increased pressure condition
- Equipment set for low-voltage apparatuses and uninterrupted supply aggregates testing

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At EEPL department:
20 teachers,
3 researchers,
4 Ph.D. students.

Acting Head of department Ph.D. (Techn)
Associated-Professor,
Alexander V. KARALIUNETZ
MEDVEDEV V.T.

■ Main Lines of Research

Research Supervisor

- **Creation of unified ecology monitoring system**
Professor Medvedev V.T., Associated-professor Suzdaleva A.L.,
senior researcher Skibenko V.V.
- **Electric safety**
Professor Medvedev V.N., Associated-Professor Karaliunetz A.V.
- **Electromagnetic compatibility**
Professor Kolechitskiy E.S.
- **Development and implementation of diagnostic system for bronchopulmonary diseases**
Professors Medvedev V.T., Malyshev V.C., Associated-Professor Karaliunetz A.V.
- **Scientific-methodic support of certification testing and certification system for labor protection in institutions**
Professor Medvedev V.T., Associated-Professor Karaliunetz A.V.
- **Development and implementation of automated monitoring and control systems for technological processes of ecological direction**
Associated-Professors Makarov A.K., Karaliunetz A.V., Ph.D. (Techn.) Bukharov D.G.
- **Sensors development of new generation for harmful substance determination in environment**
Associated-Professor Monakhov A.F.

■ Agreements, contracts, projects supported by the state budget

- Investigation of electric technological processes influence to environment and development of its negative effect reduction principles
- Execution of scientific-technological examination and investigation of exploitation features of hardware-software complexes
- Constructive support of serial output of apparatuses MILTA
- Search investigations and development of electrical machines vibro-acoustic parameters reduction methods for air-force objects
- Investigation of electric technological process influence on environment and development of its negative effect reduction principles
- Development of computer diagnostic complex for bronchopulmonary system condition monitoring in pediatric practice
- Investigation of dangerous and harmful manufacturing factor levels at the working places in order to execute its attestation and development the recommendation to these levels reduction

■ Key publications

- *Labor* protection and industrial ecology / V.T. Medvedev, A.V. Karaliunetz etc. «Academia» Publisher, 2006.
- *Chebysheva O.V.* Fundamentals of soil science and hydrology. MPEI Publishing House, 2006. 64 p.
- *Malyshev V.S., Kondratieva O.E.* Perfection of traumatism analysis methods on power engineering branch enterprises // MPEI Vestnik. 2006. No 4. P. 93–95.
- *Fiodorova E.V., Borovkova A.M., Fesenko M.A.* Manufacture traumatism and employee labor protection // MPEI Vestnik. 2006. No 4. P. 93–95.
- *Suzdaleva A.L., Beznosov V.N., Kuchkina M.A.* Ecology as area of practical activity / // MPEI Vestnik. 2006. No 4. P. 74–85.

■ Dissertations

- *Krasnykh A.A.* Development of design bases and complex creation of electrical safety means and monitoring facilities for electric transfer air-line at voltage up to 35 kV for its exploitation safety increase: Dr. Sci. (Techn.) Dissertation. 2005.

■ Partners

- «NPO of space instrumentation» company, Moscow
- R&D Institute of pediatrics and pediatric surgery, Moscow
- RAO «EES Rossii», Moskva

■ Unique equipment

- Computer-diagnostic complex PATTERN
- Automate system of ecology monitoring and meteorological parameters
- Complex for certification tests of information technology equipment and working places attestations on labor protection correspondence establishment
- Automated system for water quality control
- Complex for automated monitoring of vibro-acoustic characteristics of electrical machines and mechanisms
- Anechoic chamber with equipment complex for vibration and noise investigation

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At EM department:
 22 teachers,
 22 Ph.D. students.

Head of department
 Doctor of technical sciences,
 Professor Viktor K.PAULI

■ Main Lines of Research

Research Supervisor

□ Quality system management

Professor Lozenko V.K.

□ Management of state and municipal purchases: organization and execution of competitive tenders

Professor Vedeneev G.M.

■ Key publications

- *Vedeneev G.M., Efimov A.R., Ivanov A.P., Lisin P.V.* Documents forms for production purchase by quotation inquiry method: MPEI Publishing House, 2005. 136 p.
- *Vedeneev G.M., Kobzev G.N., Goncharov E.Yu.* Competitive auction in Russia: Historical experience. — 2nd edition, supplemented. MPEI Publishing House, 2005. 74 p.
- *Competitive* auction in Russia. Publication review / G.M. Vedeneev, I.V. Grishin, A.R. Efimov etc.: reference book. MPEI Publishing House, 2005. 128 p.
- *Competitive* auction in Russia: Moscow experience / under edition of A.V. Romanovskiy, G.M. Vedenev — 2nd edition, supplemented: MPEI Publishing House, 2005. 82 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* Documents preparation for execution of open competition on product purchase — 4th edition: MPEI Publishing House, 2005. 144 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* Documents forms for execution of open competitions on product purchase. — 2nd edition, supplemented: MPEI Publishing House, 2005. 100 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* To help of studying the Federal Law No 94-FL dated 21.07.2005. Quotation inquiry (examples and comments). MPEI Publishing House, 2006. 69 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* To help of studying the Federal Law No 94-FL dated 21.07.2005. Quotation inquiry (documents forms). MPEI Publishing House, 2006. 60 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* To help of studying the Federal Law No 94-FL dated 21.07.2005. Subjects of law-relations and their functions at order arrangement for state and municipal needs. MPEI Publishing House, 2006. 76 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* To help of studying the Federal Law No 94-FL dated 21.07.2005. Regulations of order arrangement procedures for state and municipal needs. MPEI Publishing House, 2006. 40 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* To help of studying the Federal Law No 94-FL dated 21.07.2005. Notification preparation about the open competition execution. MPEI Publishing House, 2006. 24 p.

- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* To help of studying the Federal Law No 94-FL dated 21.07.2005. Extractions from the law made by professionals. MPEI Publishing House, 2006. 28 p.
- *Vedeneev G.M., Efimov A.R., Ivanov A.Yu.* To help of studying the Federal Law No 94-FL dated 21.07.2005. Quotation inquiry for humanitarian help provision and for critical situation consequence elimination (documents forms). MPEI Publishing House, 2006. 77 p.
- *Aleksakhina L.I.* Quality control. Economic aspect. MPEI Publishing House, 2006. 24 p.
- *Zuev Yu.Yu.* Fundamentals of competitive technique implementation and effective solution making. MPEI Publishing House, 2006. 402 p.
- *Zuev Yu.Yu.* Practical optimization of technical systems and management solutions i innovation activity. MPEI Publishing House, 2005. 104 p.

■ Dissertations

- *Fediunin A.V.* Methods for effectiveness increase of innovation solutions: Cand. Sci. (Econ.) Dissertation. 2005.
- *Kozlov A.I.* Peculiarities of innovation-investment development in historical and cultural megapolis center (in Moscow as an example): Cand. Sci. (Econ.) Dissertation. 2005.
- *Fateev V.I.* Substantiation of innovation projects for converter manufacture modernization: Cand. Sci. (Econ.) Dissertation. 2005.
- *Razniak V.* Methods and implementation schemes for quality system management on the energy complex enterprises on the basis of Polish energy companies experience: Cand. Sci. (Econ.) Dissertation. 2005.
- *Uchkin M.S.* Possibility substantiation of gas-producing growth using the technologies for synthetic liquid fuel production: Cand. Sci. (Econ.) Dissertation. 2005.
- *Vasilieva E.V.* Formation and implementation of effective investment-building policy of megapolis building development (in Moscow as an example): Cand. Sci. (Econ.) Dissertation. 2005.

■ Partners

- Zavod avtotraktornogo oborudovania, Moscow
- RIA «Avtoelektronika», Moscow
- «Crossna motor» company, Moscow
- «Agregat-privod» company, Moscow
- «Safonov Electromechanical plant» company, Safonovo, Smolensk region
- «Raketno-kosmicheskij kompleks Energia» company, Korolev, Moscow region
- Lavochkin RIA, Moscow
- Lapse RIA, Kirov
- National foundation for expert training, Moscow
- Moscow foundation for expert training, Moscow
- Association of finance-industrial groups, Moscow
- Electromashexport, Moscow
- Pro-Invest Consulting, Moscow
- Institute of industrial development, Moscow
- Academy of national economy at RF Government, Moscow
- Academy of Public Service, Moscow
- State University of Management, Moscow

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- ❑ Novosibirsk Electric Engineering University, Novosibirsk
 - ❑ International Independent ecology-politology university, Moscow
 - ❑ Russian Association of business education, Moscow
 - ❑ Higher school of economics — Institute of state purchases, Moscow
 - ❑ Moscow Government Department on Competitive policy (Tender Committee) Monetary Financial Division of Moscow Government
 - ❑ Technical University Hangzhou, China
 - ❑ Nilsbrok College, Kopenhagen, Denmark
 - ❑ Technical University of Gabrovo, Bulgaria
 - ❑ Slovak Technical University in Bratislava, Slovakia
 - ❑ Middlesex university business school
 - ❑ University of Greenwich London metropolitan university London school of Economics

At AED department:

25 teachers,

30 researchers,

30 Ph.D. students.

Head of department Ph.D. (Techn.),
Associated-Professor Yuri N. SERGIEVSKIY

■ Main Lines of Research

Research Supervisor

- **Control system development with technological parameters regulation by electrical drive facilities**

Associated-Professor Kozyrev S.K., Professor Osipov O.I.

- **Methods and technical facility development for resources and energy savings by electrical drive means**

Professor Il'inskiy N.F., senior researcher Ladygin A.N.

- **Creation of methods and technical facilities for gated-inductor electrical drive control**

Professors Il'inskiy N.F., Bychkov M.G., Associated-Professor Kozachenko V.F.

- **Development of theoretical bases and control systems for high-precision tracking electrical drives**

Professor Terekhov V.M.

- **Development of precision double-channel electrical drives with piezo- and magnetostrictive motors**

Senior researcher Nikolskiy A.A.

- **Development of effective systems of asynchronous electrical drive on the basis of thyristor voltage regulators**

Professor Masandilov L.B.

- **Development of exact motion reproduction system on the basis of multi-coordinate step motors**

Senior researcher Balkovoy A.P.

- **Development of multi-purpose microprocessor controller on new element base for electrical drive**

Associated-professor Kozachenko V.F.

- **Methodic and technical support for electrical drives testing**

Associated-professor Sergievskiy Yu.N.

- **Development of frequency-controlled electrical drives on modern element base**

Senior researcher Kudryavtsev A.V., associated-professor Ostrirov V.N.

■ Agreements, contracts, projects supported by the state budget

- Comparative analysis and determination of developments perspectives in area of electrical drives and its components
- New methods and algorithms of development for energy saving in the systems of building air heating
- Modes Investigation and operation algorithms development for the control station of pumping aggregates group
- Development of promising technical solutions for mass regulated electrical drive of gated-inductor type

- Modernization of pumping installation electrical drive on the basis of complete energy- and resources saving device with frequency converter
- Development of calculation methods of object-oriented gated-inductor electrical drives
- Development of controller for gated-inductor electrical drive
- Testing and certification of low-voltage complete devices, electronic converters and electrical motors
- Development and implementation of magnetostrictive electrical drives for turning machine for precision turning of car pistons
- Design development of linear step electrical drive
- Development of frequency-controlled asynchronous electrical drive with vector control
- Development of technique for effectiveness increase of control system of electrical drive manufacture quality control

■ Key publications

- *Electrical* drive and control systems // MPEI papers collection. MPEI Publishing House, 2005. No 681. 90 p.
- *Regulated* electrical drive. Experience and application perspectives // Proc. of semin. MPEI Publishing House, 2006. 95 p.
- *Terekhov V.M., Osipov O.I.* Control systems for electrical drive: textbook. «Academia» Publisher, 2005. 300 p.
- *Il'inskiy N.F.* Journal «Electricity» and electrical drives development // Elektrichestvo. 2005. No 7. P. 70–72.
- *Il'inskiy N.F., Dokukin A.L., Kuz'michov V.A.* Heat models of gated-inductor electrical motors // Elektrichestvo. 2005. No 8. P. 27–33.
- *Electrical* drive on the basis of inductor motor with electromagnetic excitation / V.F. Kozachenko, V.N. Ostrirov etc. // Elektronnye komponenty. 2005. No 6. P. 60–67.
- *Fukalov R.V.* Implementation variants of sensorless microprocessor control system for the gated-inductor electrical drive // MPEI Vestnik. 2005. No 1. P. 50–55.
- *Nesterov E.V.* Basing geometric parameter determination for gated-inductor motor of inverse construction // Elektrichestvo. 2006. No 5. P. 32–34.

■ Dissertations

- *Nikiforov A.D.* Development of adaptive control system for frequency-controlled electrical drive: Cand. Sci. (Techn.) Dissertation. 2005.
- *Rezvin S.B.* Development of system for complex automation of cable line on the basis of frequency converters and controllers with the network possibilities: Cand. Sci. (Techn.) Dissertation. 2005.
- *Sorokin G.A.* Electrical drives of energy helio-installations without emission concentration: Cand. Sci. (Techn.) Dissertation. 2005.
- *Fukalov R.V.* Development of multi-purposes modular sensorless control system for gated-inductor electrical drive: Cand. Sci. (Techn.) Dissertation. 2005.
- *Khramshin V.R.* Electromechanical regulation system for thin band pull on the broad-band hot rolling mill: Cand. Sci. (Techn.) Dissertation. 2005.
- *Dianov A.N.* Development and investigation of sensorless control system for gated motor: Cand. Sci. (Techn.) Dissertation. 2005.
- *Tashlitskiy M.M.* Development of experimental determination methods for parameters and mechanical characteristics of asynchronous motors: Cand. Sci. (Techn.) Dissertation. 2005.

- *Dokukin A.L.* Heat models of gated-inductor motors in electrical drive: Cand. Sci. (Techn.) Dissertation. 2005.
- *Nesterov E.V.* Development of gated-inductor motors for light electrical transport facilities: Cand. Sci. (Techn.) Dissertation. 2005.
- *Kuzmichov V.A.* Development of methodic and hardware means for gated-inductor electrical drive testing: Cand. Sci. (Techn.) Dissertation. 2005.
- *Kamara Amara.* Excitation control channel synthesis in double-zone DC electrical drive: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- «Elektroprivod» company, Moscow
- «All-Russia R&D Institute of electromechanics» company, Moscow
- Yaroslavl' elektromashinostroitel'ny zavod, Yaroslavl'
- Moscow representative office of Siemens company, Germany
- Moscow representative office of Schneider Electric, France
- Ilmenau Technical University, Germany
- «Rudoavtomatika» company, Zheleznogorsk, Kursk region
- HIWINTechnology Corp., Taiwan

■ Unique equipment

- Multi-purposes setup for converters, motors and complete electrical drives testing at normalized net and load parameters
- Thermal-moister camera with testing equipment for strength and chatter stability
- Computerized setup for automated electric motor testing



ELECTRIC TRANSPORT DEPARTMENT (ET)

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At ET department:
14 teachers,
5 researchers,
11 Ph.D. students,
1 traineer.

Acting Head of department Ph.D. (Techn),
Ass. Professor
Vladimir A. GLUSHENKOV

■ Main Lines of Research

Research Supervisor

- **Development of electric drives for autonomous rolling-stock**
Senior researcher Trofimenko V.I., Associated-Professor Kolobov M.G.
- **Development of electric equipment for trams and trolley-buses**
Senior Researcher Glushenkov V.A.
- **Development of electric supply and traction substation systems for urban electric transport**
Professor Sleptsov M.A., Associated-professor Dolaberidze G.P.
- **Development of rail and special rolling-stock**
Senior Researcher Trofimenko V.I.
- **Automated control systems for main transport**
Professor Tulupov V.D.

■ Agreements, contracts, projects supported by the state budget

- Investigation of reversible traction converter for the rolling stock of the urban electric transport
- Investigation of traction converter for trolley bus with mixed excitation motor
- Development of traction electric equipment for the trolley bus with IGBT regulators
- Development of traction electric equipment for the urban electric transport rolling stock
- Development of converter for trolley bus traction electric drive
- Development of complete traction electric equipment for the tram-car with reduced floor level
- Development and manufacture implementation of the effective electric drives on the basis of inductor motors for the auxiliary needs of urban electric transport rolling stock
- Development of ecologically friendly and effective electric drives on the basis of commutatorless AC motors with usage of promising semiconductor devices
- Development of special electric equipment, assembling, testing and energy indexes estimations for the pre-production section model of electric train ER2S
- Adjustment and development testing of traction electric equipment experimental complexes with asynchronous traction electric motor for electric buses and trolley buses
- Protection of DC cables for the ground-based urban electrical transport
- Development of asynchronous traction electric drives for car
- Development and implementation of converter power series for traction asynchronous drive of different purposes
- Development of traction drive with linear asynchronous motor for transport mini-system

- Choice of creation conception for traction electric drive with electric energy recuperation system and energy unit on the basis of electrochemical generator with hydrogen-air fuel elements for the pre-production model of small capacity urban bus
- Development and implementation of traction converters for trolley buses and electric buses
- Theoretical principle development for transport systems creation with combined energy units and life cycle intellectual support
- Development of conceptual conditions and methodic bases of energy effectiveness and ecological safety increase for electric complexes and systems
- Development of structure conception of the electric drives with energy recuperation and accumulation system for urban public transport

■ Key publications

- *Fundamentals* of electric transport / M.A. Sleptsov, A.V. Prokopovich, V.D. Tulupov etc.; under edition of M.A. Sleptsov. «Academia» Publisher, 2005. 520 p.
- *Marchenkov A.P.* Microprocessor regulators design. MPEI Publishing House, 2005. 88 p.
- *Dolaberidze G.P.* Potential diagrams on rail nets, undergrounded construction protection against the roaming current corrosion. MPEI Publishing House, 2005. 20 p.
- *Savina T.I., Borodin D.E., Borodina V.V.* Model development for automatic repeated switching-on device // MPEI Vestnik. 2005. No 5. P. 61—67.
- *Prechisskiy V.A., Bogdanov S.A., Martishin S.A.* Electric version of school-book on discipline «Specific aspects of automatics system» // MPEI Vestnik. 2005. No 5. P. 68—73.
- *Tulupov V.D., Minaev D.V.* Effectiveness of recuperative DC electric trains breaking // Zheleznodorozhny transport. 2005. No 10. P. 47—50.
- *Artiomov M.L., Prokopovich A.V.* Energy accumulators for shunting diesel locomotive / Proc. of XI Intern. conf. for students. «Radio electronics, electrical and power engineering» In 3 vol. MPEI Publishing House, 2005. V. 2. P. 175—176.
- *Blagov A.Yu., Tulupov V.D.* Possibility estimation of electrical equipment quantity reduction on DC electrical trains // Ibid. P. 176—177.
- *Bol'shakov A.V., Osipov V.E.* Diagnostic system for traction net SDTS-1 // Ibid. P. 178—179.
- *Borodin D.E., Savina T.I.* Micro-controller application in control systems of traction substations // Ibid. P. 179—180.
- *Borodina V.V., Savina T.I.* Computer model for automatic repeated switching-on device // Ibid. P. 180—181.
- *Garbuziuk V.S., Tulupov V.D.* Power circuits scheme and energy effectiveness of traction DC electric drives with traction machine independent excitation // Ibid. P. 181—182.
- *Danilov D.B., Tulupov V.D.* Technical-economical indexes of traction subway electric trains drives with independent excitation of traction machines // Ibid. P. 182—183.
- *Il'inskiy Yu.A., Sleptsov M.A.* Operation optimization for autonomous passenger energy saving system // Ibid. P. 183—184.
- *Kazakov I.S., Kolobov M.G.* Electric braking in system with linear motors and supercapacitors for mono-rail way // Ibid. P. 185—186.
- *Kazakov I.S., Kolobov M.G.* Traction electric drive with energy accumulators for hybrid electric car // Ibid. P. 186—187.

- *Koval' A.Yu., Tulupov V.D.* Energy effectiveness of modernized traction electric drive energy saving system application on the electric subway and suburban traffic trains // Ibid. P. 189—190.
- *Koval' A.Yu., Tulupov V.D.* Possible problem solution of more flexible DC electric train formation // Ibid. P. 190—191.
- *Minaev D.V., Tulupov V.D.* Mathematical model for electrical traibns indexes calculation and the results obtained // Ibid. P. 192—193.
- *Mikhailov M.A., Tulupov V.D.* Preliminary estimation of technical-economic indexes for the alternative traction electric drive systems for subway electrical trains // Ibid. P. 193—194.
- *Samarin S.V., Tulupov V.D.* Technical-economical effectiveness of traction machines independent excitation usage on DC electric trains // Ibid. P. 194—195.
- *Khechinashvili A.R., Sleptsov M.A.* Voltage measurement problems for on-board current sources on electric cars // Ibid. P. 195—196.
- *Sleptsov M.A., Borodin D.E.* Modern traction electric drives for urban electric transport with energy accumulators and hybrid sources // Proc. of VI conf. «New developments in area of electrical engineering for cars and electric transport». Inter-electro Publisher, 2005. P. 10—11.
- *Il'inskiy Yu.A.* Structure conception of electric supply control system for passenger car with the equipment diagnostic functions // Ibid. P. 12.
- *Glushenkov V.A., Kuvshinov A.C.* Traction electric drives for tam-car and trolley buses // Ibid. P. 13—14.
- *Tulupov V.D.* Real effectiveness of alternative systems of traction electric drive systems for cargo AC electric locomotive // Proc. of III Intern.symp. «Electrification and energy saving infrastructure development on railway transport electric rolling-stock». Sankt-Peterburg, 2005. P. 70—71.
- *Tulupov V.D., Kiriukhin Yu.A., Minaev D.V.* Comparative effectiveness of energy saving system for traction electric drive of DC electric trains in joining scheme and on single motor car // Ibid. P. 72—73.
- *Glushenkov V.A., Filin Yu.I., Khmarskiy V.N.* Regulation of traction electric drive with account of potential conditions on collectors of traction electric motors // Proc. of XI Intern. conf. «Electromechanics, electrotechnologies, electrical materials and components». MPEI Publishing House, 2006. V. 2. P. 136—137.
- *Koval' A.Yu., Tulypov A.Yu., Marchenkov A.P.* Modernization ways for traction electric drive of subway cars // Ibid. P. 163—164.
- *Borodin D.E., Sleptsov M.A.* Traction current regulation in trolley bus // Ibid. P. 165—166.
- *Garbuziuk V.S., Tulupov V.D., Kiriukhin Yu.A.* Efficient ways of traction electric drive perfection for DC electric trains // Ibid. P. 159—162.
- *Kazakov I.S., Kolobov M.G.* Hybrid electric car // Ibid. P. 157—158.
- *Borodina V.V., Savina T.I.* Starting converters for synchronous machines // Ibid. P. 167—168.
- *Nikolaev D.Yu., Dolaberidze G.P.* 0,6 kV cable protection system // Ibid. P. 169—170.
- *Kazakov I.S., Kolobov M.G., Sokolova E.M.* Development of traction electric drive for mono-rail transport system with linear asynchronous motor // Ibid. P. 171—172.
- *Prechisskiy V.A., Martishin S.A.* Interactive complex on control devices of electric transport // Ibid. P. 173—174.

- *Tulupov V.D.* Extremely effective traction electric drive system for DC electric trains // Ibid. P. 175—177.
- *Borodin D.E., Sleptsov M.A.* Control systems creation for traction substations with micro-controllers usage // Proc. of XII Intern. conf. for students. «Radio electronics, electrical and power engineering» In 3 vol. MPEI Publishing House, 2006. V. 2. P. 180—181.
- *Borodina V.V., Savina T.I.* Significance of breakdown process modeling at investigation of electric supply system operation // Ibid. P. 181—182.
- *Garbuziuk V.S., Tulupov V.D.* Potential possibilities of traction electric drive perfection for DC electric trains // Ibid. P. 185—186.
- *Kazakov I.S., Kolobov M.G., Sokolova E.M.* Linear drive of transport carriers // Ibid. P. 186—187.
- *Kazakov I.S., Kolobov M.G.* Traction electric drive for hybrid electric car // Ibid. P. 187—188.
- *Koval' A.Yu., Tulupov V.D.* Analysis of present and alternative systems of traction electric drive for subway trains // Ibid. P. 189—190.
- *Mikhailov M.A., Tulupov V.D.* To the problem of valid choice of traction electric drive system for electric movable train // Ibid. P. 194—195.
- *Nikolaev D.Yu., Dolaberidze G.P.* DC cable lines protection systems // Ibid. P. 196.
- *Popov A.S., Prokopovich A.D.* Subway car with energy accumulator // Ibid. P. 197—198.
- *Tassev T.Z., Sleptsov M.A.* Analysis of electric movable train application possibility for students transportation between the university buildings in Vahr Dar town // Ibid. P. 201—202.
- *Tulupov V.D.* Real effectiveness of alternative systems of traction electric drives for cargo AC electric locomotives // MPEI Vestnik. 2006. No 2. P. 56—63.

■ Patents

- *Patent 50061 RF.* Regulation device for traction DC electric drive /V.A. Glushenkov, G.A. Smerdov, V.N. Khmarskiy, Yu.I. Filin // BI. 2005. № 34.

■ Partners

- «Dinamo» company, Moscow
- «Sankt-Peterburg trolley-bus plant» company, Sankt-Peterburg
- «Trolley bus plant» company, Engel's, Saratov region
- «Zaporozhie elektroapparatny zavod», Zaporozhie, Ukraine
- «Vologdaelektrotrans» company, Vologda
- «Trans-Alfa» company, Vologda
- «Ratep» company, Serpukhov, Moscow region
- «Tatelektromash», Naberezhnye Chelny, Tatarstan Republic
- State company «Mosgortrans», Moscow
- State company «Gorelektrotrans», Sankt-Peterburg
- State company «Moscow subway», Moscow
- «Crossna-Motor» company, Moscow
- MosgortransNIIproekt, Moscow
- Moscow rail way — branch of RZhD
- Moscow locomotive-repair plant
- R&D Institute of «Elektrotiazhmash» plant, Khar'kov, Ukraine

- «All-Russia R&D Institute of electric locomotive machinery» company, Novocherkassk
- RIA «Novocherkassk electric locomotive plant» company, Novocherkassk
- «Zavod Radiopribor»), Sankt-Peterburg
- Design Bureau «Yuzhnoe», Dnepropetrovsk, Ukraine
- Scientific-Technical Center «Temp», Moscow
- VNIPTIAEP «Dinamo», Moscow
- R&D Institute of urban electric transport, Moscow
- «Technical Center Electrotransservice», Moscow
- «Tatra-Yug» company, Odessa, Ukraine
- «Energia» company, Moscow
- Moscow industrial Association «Aggregate»
- «Maikop trolley bus Division»
- Raketno-kosmicheskiiy kompleks «Energia», Koroliov, Moscow region
- Moscow Committee on science and technologies

■ Unique equipment

- Installation for traction electric drives testing for trolley buses and motor-wheel machines
- Installation for electric drive physical modeling with inertial masses for transport means
- Setup for electrical drive testing with gated traction motors
- Modeling setup for diesel-generator installation for cars with motor-wheels
- High-voltage setup for monitoring and testing of power semiconductor devices
- Setup for car electric drive testing
- Setup for high-voltage static converters testing for inherent needs of tram and trolley bus
- Setup for motor-compressor testing with inductor motor of trolley bus or subway moveable train
- Setup for electric drive testing for trams and trolley buses
- Setup for traction motor testing for trams and trolley buses by pumpback method
- Setup for DC and AC electric drive testing for motor-wheel machines
- Setup for traction drive testing of Moon-buggy and power barrows
- Setup for linear asynchronous drive testing
- Setup for microprocessor control system testing and adjustment for traction AC and DC drives



POWER SUPPLY OF INDUSTRIAL ENTERPRISES DEPARTMENT (PSIE)

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At PSIE department:
19 teachers,
2 researcher,
23 Ph.D. students.

Head of department Ph.D. (Techn.)
Associated-Professor, Sergey A. TSYRUK

■ Main Lines of Research

Research Supervisor

- **Energy audit at industrial enterprises and at electric nets**
Associated-Professor Tsyruk S.A.
- **Automation of calculation-experimental investigations of transients in power supply systems of industrial enterprises**
Professor Gamazun S.I.
- **Energy consumption parameters determination and forecasting for existing and rebuilt enterprises with optimization of mounted and repaired electric equipment structure**
Professor Kudrin B.I.
- **Electromagnetic compatibility of power converter devices with the electric supply system of industrial enterprises**
Senior researcher Bure I.G.
- **Electrical supply of industrial enterprise consumers from autonomous supply sources**
Associated-Professor Hevsuriani I.M.

■ Agreements, contracts, projects supported by the state budget

- Development of electric energy and power measurement execution technique by the automated information-measurement system of commercial electric energy account on «Verkhnevolzhskiy kaskad GES» company
- Development of electric energy and power measurement execution technique by the automated information-measurement system of commercial electric energy account on «Kamskaya GES» company
- Development of electric energy and power measurement execution technique by the automated information-measurement system of commercial electric energy account on «Nizhegorodskaya GES» company
- Development of testing technique of the automated information-measurement system of commercial electric energy account on «Nizhegorodskaya GES» company in order to approve the single specimen type for «Kamskaya GES» company
- Development of verification technique of the automated information-measurement system of commercial electric energy account on «Nizhegorodskaya GES»
- Development of verification technique of the automated information-measurement system of commercial electric energy account on «Kamskaya GES»
- Implementation of combined control system for electric equipment repairs
- Development of verification technique of the automated information-measurement system of commercial electric energy account on «Nizhegorodskaya GES»
- Primary energy inspection of «Vologradenergo» branch «Pravoberegnaya electric nets»
- Theoretical bases investigation and development for electric energy saving and energy consumption regulation at enterprises with the continuous technological cycle

- Conception development and theoretical optimization substantiation for energy consumption modes and electric energy saving at enterprises with continuous technological process
- Standards calculation of electric energy technological losses at its transmission via nets of RZHD company in 2007
- Fulfilment of scientific-technical researches for searching the technical solutions directed to supply main substation KNC-11 with development of recommendations on economy
- Energy inspection (energoaudit) of technological and energy equipment of petroleum engineering at «Holmogor-neft», «Muravlensk-neft», «Zapoliar-neft» for «Sibneft-Noyabrskneftegas»

■ Key publications

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- *Kireeva E.A., Tsyruk S.A.* Electric supply of housing and public buildings // Library of «Energetik». No 8 (80). «Energopromrecurs», «Energetik». 2005. 95 p.
- *Kudrin B.I., Oshurkov M.G.* Electrica: object, mathematics, dictionary. Tomsk: TGU Publisher, 2005. 240 p.
- *Kudrin B.I.* State plan of market electrification of Russia. IPN RAN Publuser, 2005. 205 p.
- *Kudrin B.I.* Rules access of electric energy consumer to the subjects service. Tekhnika Publisher, 2005. 26 p.
- *Bystritskiy G.F.* Foundations of power engineering textbook for universities. «INFRA-M» Publisher, 2005. 247 p.
- *Bystritskiy G.F.* Basic power engineering: school-book for colleges and universities. «Academia» Publisher, 2005. 204 p.
- *Instruments* and electric equipment diagnostics and measurements means in electric supply systems: reference book / E.A. Kireeva, V.I. Grigoriev, V.A. Mironov etc. «Kolos» Publisher, 2006. 272 p.
- *Reference* for power engineering specialist / V.I. Grigoriev, E.A. Kireeva, G.F. Bystritskiy etc.// «Kolos» Publisher, 2006. 486 p.
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- *Bure I.G., Hevsuriani I.M., Bure A.B.* Regulated reactive power source for electric energy quality support in workshop nets // Electro. 2005. No 1. P. 38—41.
- *Electric* energy consumption modeling of oil-pipe-line sections with account of pumping aggregates / L.S. Rodina, N.V. Tokochakova, Yu.N. Kolesnik, S.I. Polovinko// MPEI Vestnik. 2005. No 2. P. 61—65.
- *Kudrin B.I.* To Rules of electrical energy consumer access to the services of electric power engineering subjects // Electrica. 2005. No 6. P. 3—18.
- *Terminological* support of energy consumption, energy savings, energy effectiveness / E.V. Krasikov, Yu.V. Matiunina, M.G. Oshurkov etc. // Electrica. 2005. No 7. P. 35—48.
- *Bykov E.A.* Peculiarities of uninterrupted power supply system structure for industrial enterprises and infrastructure objects // Electrica. 2005. No 2. P. 29—31.
- *Amelkina N.A., Bodrukhina S.S., Tsyruk S.A.* Determination of factual contribution of asymmetrical consumers into electric energy quality distortion in the point of mutual connection // Electrica. 2005. No 4. P. 17—21.
- *Kudrin B.I.* Consumer is not the electric power engineering subject! // Electrica. 2005. No 10. P. 12—13.

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- *Ancharova T.V., Avetyan A.G., Yurov K.M.* Application features of unregulated automatic switches in workshop nets of industrial enterprises // MPEI Vestnik. 2006. No 1. P. 82–88.
- *Kudrin B.I.* Notes on regional energetic // Electrica. 2006. No 8. P. 3–8.
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- *Tsyruk S.A.* Problems and perspectives of Russian energetic from the point of view of electric energy consumer // Electrica. 2006. No 11. P. 3–11.
- *Bystritskiy G.F., Abramkin V.P.* About overloading of air and cable transmission lines // Electrica. 2006. No 4. P. 21–25.
- *Sazhenkova N.V., Tsyruk S.A., Kulaga M.A.* Safety provision at indirect voltage // Electrica. 2006. No 3. P. 21–25.
- *Kireeva E.A., Bystritskiy G.F.* Vibro-diagnostical facilities for electric equipment of the electric supply systems // Electrica. 2006. No 9. P. 39–42.
- *Maslov A.V.* About the fire safety of 0.4 kV cables // Electrica. 2006. No 2. P. 43–44.
- *Ancharova T.V., Stebunov D.V.* Action influence analysis of pulsation factor decreasing on the grouped lighting net // Electrica. 2006. No 9. P. 30–33.
- *Pupin V.M., Sakov V.V.* Instrumental inspections of electric load schedule in housing // Electrica. 2006. No 3. P. 7–9.
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- *Pupin V.M., Gamazin S.I., Markov Yu.V.* Provision of electric supply reliability and electric energy quality by modern technical facilities // Electrica. 2006. No 10. P. 22–26.
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- *Sazhenkova N.V.* Development of technique for effectiveness testing of protection operation at indirect touch in electric units up to 1 kV on electric supply system design stage: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- «Elektroproekt», Moskva
- Polytechnic University, Wroclaw, Poland
- West-Siberia metallurgical plant, Novokuznetsk
- «FosAgro» company, Moscow
- Inter-regional agency of electric energy and power market company, Moscow
- «Ammofoc» company, Cherepovets
- «Tobol'sk-Neftekhim» company, Tobol'sk
- «Karelskiy Okatysh» company, Kostamuksha
- «Sibneft-Noyabrsk-neftegas» company, Noyabrsk
- «Tolyatti-kauchuk» company, Tolyatti
- «Voronezhsintezkauchuk» company, Voronezh
- «Kuibyshevskiy neftepererabatyvaushiy zavod» company, Novokuibyshev

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3 researchers,

9 Ph.D. students.

Head of department Ph.D. (Techn.),

Associated-Professor

Winner of RF President Award

Yuri P. GUSEV

■ **Main Lines of Research**

Research Supervisor

- **Control of electrical power plants under normal and emergency modes**

Professor Vasin V.P.

- **Scientific base development for electric installation design, development of methods and computer programs for short-circuit calculations**

Associated-Professor Gusev Yu.P.

- **Operation modes and diagnostic of main electrical engineering equipment for electric stations and sub-stations**

Professor Starshinov V.A.

■ **Agreements, contracts, projects supported by the state budget**

- Development of education quality indexes in higher technical educational institutions and the information system structure for their monitoring
- Structure and mathematical tool development for information-analytical support system of power oil-filled transformer exploitation for electric stations and sub-stations
- Effective scientific-technical accompaniment for the DC systems at new construction, technical modernization and reconstruction of FSK EES company
- Effective scientific-technical accompaniment for the relay protection systems and DC systems at new construction, technical modernization and reconstruction of FSK EES company
- Development of new calculation methods for short-circuit currents and estimation of their electrodynamic and thermal affects on the electrical equipment
- Adjustment parameters calculation for protection apparatuses of Mosenergo 90 and 213 sub-stations DC panels
- Adjustment parameters calculation for protection apparatuses of DC panel on sub-station 785 «Borisovo»
- Adjustment parameters calculation for protection apparatuses of DC panel on sub-station «Chistaya»
- Electrical cables testing on non-inflammability and automatic devices choice for unitized transformer substation
- Software for short-circuits calculation in AC electric installations with voltage up to 1 kV
- Software development for short-circuit currents calculation in DC inherent net of sub-stations and electric stations
- Software of automated development system of design documentation for switch and control GEAR boxes secondary circuits

- Software for engineer-electric operation automation
- Development and creation of educational-training complexes for electric workshop personnel training
- Investigation and operation analysis of protection means for operative DC net
- Software for short-circuit calculation in AC and DC electric installations with voltages up to 1000 V and for asynchronous motors self-starting calculation for 6 kV voltage
- Development of CAD system and expert's estimation for DC electric installations of electric stations and sub-stations
- Development and investigation of promising fast-acting gas-turbine energy units
- Development of new generation of reactors and highly-reactance current distributor on the basis of magnet-concrete for short-circuit current limitation
- Theoretical bases and diagnostic facilities development for inherent needs electric installations of electric stations and sub-stations
- Software development for protective apparatuses selectivity calculation in operative DC net
- Hardware-software complex development for testing the operative DC nets of sub-stations
- Operation mode optimization for TPP electric equipment
- Equipment operation reliability increasing at emergency situation happening
- Hardware-software complex development for automated diagnostic of rechargeable batteries conditions

■ Key publications

- *Short-circuit* calculation and electric equipment choice: school-book / I.P. Kriuchkov, B.N. Neklepaev, V.A. Starshinov etc.; under edition of I.P. Kriuchkov, V.A. Starshinov. «Academia» Publisher, 2005. 416 p.
- *Zhukov V.V.* Short-circuit calculation in DC electric installations. MPEI Publishing House, 2005. 160 p.
- *Abdurakhmanov A.M., Misrikhanov M.Sh., Neklepaev B.N., Shuntov A.V.* About structure peculiarities for switch failure flow // *Elektricheskie stantsii*. 2005. No 5. P. 54–57.
- *Abdurakhmanov A.M., Misrikhanov M.Sh., Neklepaev B.N., Shuntov A.V.* Once more about components of switch failure model // *Elektricheskie stantsii*. 2005. No 4. P. 41–48.
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- *Dolin A.P., Zvetaev S.K., Ponocho Ch., Popovich A.* Electric discharge acoustic location in measuring transformers // *Electro.* 2005. No 2. P. 27–31.
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- *Neklepaev B.N., Piratorov M.V.* Development problems of short-circuit current level coordination system on electrical stations and in electrical nets of energy systems // *MPEI Vestnik.* 2005. No 3. P. 57–65.
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- *Gusev O.Yu., Gusev Yu.P., Starshinov V.A.* Calculation and experimental methods for modes and short-circuit current determination in the nets 6..0,4 kV and operative DC // Proc. of semin. «Modern solutions in development, design and exploitation of electric equipment and inherent system needs of electric stations» (Moscow, 12–14 of Sept. 2006). CPTITO ORGRES Publisher, 2006. P. 228–245.
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- *Borisova E.S.* Choice technique perfection for disconnecting protection apparatuses in electrical installations of operative DC of electrical stations and sub-stations: Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- «Federal net company of united energy system», Moscow
- «Moscow regional electric net company», Moscow
- «ORGRES company», Moscow

■ Unique equipment

- Educational electric station 2 Ч 150 kW in power — full-scale physical model of thermal power plant electric part

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27 research staff,
32 Ph.D. students.

Head of department Ph.D. (Techn.),
Associated-Professor
Yuri V. SHAROV

■ Main Lines of Research

Research Supervisor

- **Development and implementation of methods, and means ensuring operational efficiency, reliability and stability provision of electrical power systems**

Associated-Professor Sharov Yu.V.

- **Development of method and means of stability improvement for electrical power systems**

Professor StroeV V.A.

- **Scientific bases for optimization of electrical power systems structure, parameters and operating conditions**

Associated-Professor Shul'zhenko S.V.

- **Development of automatic control and regulation systems in electrical power systems**

Associated-Professor Filippova N.G.

- **Development of methods and means for reliability provision in electrical power systems**

Professor Fokin Yu.A.

- **Flexible AC transmission systems (FACTS)**

Ph.D. (Techn.) Kuznetsov O.N.

- **Energy storage application for improving of electrical power system efficiency and reliability**

Senior researcher Nikitin D.V.

- **Development structure and methods for the integration of UPS of Russia in electrical power systems of European countries**

Senior researcher Syromiatnikov C.Yu.

- **Electromagnetic compatibility problem solutions for technical devises and electrical energy quality provision**

Senior researcher Kartashov I.I.

- **Development of modern technique for technical-economical substantiation of design solutions in electrical networks area**

Professor Zuev E.N.

- **Optimization of electrical energy losses level in electrical networks**

Ph.D. (Techn.) Shvedov G.V.

- **Automation of operation distribution networks**

Ph.D. (Techn) Ponomarenko I.S.

- **Development of flexible electrical transmission systems on the basis of controlled saturated shunt reactors**

Associated-Professor Briantsev A.M.

■ **Agreements, contracts, projects supported by the state budget**

- Investigation of current harmonics distribution in power system and development of means for increasing noise-immunity and ensuring electromagnetic compatibility of FACTS devices and electrical network
- Development of methodology in the problems of electric energy quality control
- Development of circuitry improving on functional features of shunt reactors
- Investigation of control features, allocation and operational efficiency of static compensator on the basis of controlled shunt reactor
- Development of optimal control problem solution methods for the electrical power system elements
- Development of investigation methods for the electrical power system operation modes and their control using energy storage and static compensators
- Investigation on the electrodynamic model of load nodes behavior under emergency conditions, and microprocessor device testing for anti-damage automatic
- Development of software complex for automation of distributing electrical networks operation
- Development of new educational professional programs for Masters of Science and research staff and also for the specialists in the frame of priority direction «Power engineering and energy saving»
- Scientific-organizational and scientific-methodical means of approbation and distribution of new educational professional training programs for Masters of Science and researchers in the frame of priority direction «Power engineering and energy saving»

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- *Stroev V.A., Makarov Yu.V., Reshetov V.I., Voropai N.I.* Blackouts in North America and Europe: analysis and generalization // Proc. of Intern. conf. on energetic. Sankt-Peteburg, 2005. Report No 699.
- *Sharov Yu.V., Beim R.S., Karymov R.R., Syromiatnikov S.Yu.* Electrodynamic model of electrical power systems // Elektricheskie stantsii. 2005. No 5. P. 58–63.
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- *Briantsev A.M., Dolgoplov A.G., Lurie A.I.* Putting into operation of shunt reactor magnetized 500 kV, 180 MVA // Elektrotehnika. 2006. No 12. P. 7–13.
- *For the* first time in 500 kV network the new shunt reactor of 180 MVA has been put into operation // Elektrichestvo. 2006. No 8. P. 65–69.
- *Karymov R.R., Ebadyan M.* Comparison of controlled by superposed magnetization reactor and the reactor controlled by thyristors on the basis of current higher harmonic levels generated by them // Electroenergeticheskie sistemy. 2006. No 3. P. 12–15.
- *Ponomarenko I.S.* Переносной газоанализатор «Топогаз-01» для контроля работы котельных установок // Энергонадзор и энергобезопасность. 2005. № 2. С. 55–57.
- *Ponomarenko I.S., Sumin A.G.* Universal charging-recharging aggregate IPT-MPEI.80 // Elektro-Info. 2005. No 11. P. 56.
- *Ponomarenko I.S., Skorniakov A.Yu.* An analysis and control of post-fault operating conditions and in distribution electric networks // Elektrichestvo. 2006. No 1. P. 27–32.
- *Kartashov I.I., Tul'skiy V.N.* Factual contribution of electric supply sub-system into electrical energy quality and its measuring methods // Proc. of V Intern. conf. «Electrical supply effectiveness and quality for the industrial enterprises», Mariupol, 2005. P. 131–136.
- *Kartashov I.I., Plakida A.V., Khromyshev N.K.* An analysis voltage collapse analysis in electrical nets 110..220 kV // Elektrichestvo. 2005. No 4. P. 2–7.
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- *Zuev E.N., Efentiev S.N.* Economical current intervals of wiring section for air lines – yesterday, today and to-morrow // Elektro. 2005. No 3. P. 43–48.
- *Zuev E.N.* Economical load power intervals of double-wiring transformers 110 kV // New in Russian electrical energetic. 2005. No 4. P. 20–40.
- *Zuev E.N., Efentiev S.N.* Modern boundary of economically expedient application areas o electrical transmission 110...220 kV // // New in Russian electrical energetic. 2005. No 8. P. 15–26.
- *Zuev E.N., Milovzorova A.A.* Wire section choice for air lines 110...220 kV by minimum discounted expenses criterion with account of load growth dynamic // New in Russian electrical energetic. 2006. No 10. P. 25–38.
- *Leschinskaya T.B., Polianina I.N.* Functioning effectiveness increase of the distributed nets for the regions with small load density (on example of Ioshkar-Oia electrical nets). Agroconsult Publisher, 2005. 117 p.
- *Electric* supply of agriculture / T.B. Leschinskaya, S.V. Pod'yachikh, D.A. Shpak etc. Irkutsk: Ir GSKHA Publisher, 2005. 50 p.

- *Leschinskaya T.B., Shvedov G.V., Glasunov A.A.* Multi-criteria optimization of deep feed-in parameters in urban electric supply systems with account of electric load development uncertainty. Agroconsult Publisher, 2005. 111 p.
- *Leschinskaya T.B., Kniazev P.V.* Electrical supply source choice and estimation for remote agriculture regions. Agroconsult Publisher, 2005. 120 p.
- *Electrical supply* / T.B. Leschinskaya, I.V. Naumov, S.I. Palamarchuk etc. Irkutsk. Иркутск: Ir GSKHA Publisher, 2005. 162 p.
- *Leschinskaya T.B., Klimenko S.V.* Complex estimation of self-bearing isolated conductors application in distributed networks 0,38...10 kV in regions with small load density with account of initial information uncertainty (on example of Ioshkar-Ola electric nets). MGAU Publisher, 2006. 138 p.
- *Leschinskaya T.B., Vorob'iov O.S.* Electrical supply system parameters estimation for rural districts with 6...110 kV voltage on the basis of expert-statistical methods. MGAU Publisher, 2006. 114 p.
- *Leschinskaya T.B.* Electric supply of agriculture. «Kolos» Publisher, 2006. 368 p.

■ Patents

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- *Patent 2282913 RF.* Method of control of reactor with superposed magnetization / A.M. Briantsev, A.G. Dolgopolov // Bl. 2006. No 24.
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- *Certificate No 2005610158 about official registration computer programs.* Program complex «Dispatcher advisor on vitality provision of electrical power systems» / Yu.A. Fokin, A.E. Tumanin. 2005.
- *Certificate No 2005611841 about official registration computer programs.* Program complex «Repair schedule optimization for electrical equipment in electrical power systems» / Yu.A. Fokin, D.V. Oleinik. 2005.

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- *Polianina I.N.* Increasing operational efficiency of distributed networks in the regions with low load density (on the example of Ioshkar-Ola electric nets: Cand. Sci. (Techn.) Dissertation. 2005.
- *Kniazev P.V.* Choice and estimation of electrical supply source of remote agriculture regions: Cand. Sci. (Techn.) Dissertation. 2005.
- *Shvedov G.V.* Multi-criteria optimization of deep feed-in parameters in urban electrical supply systems with the account of electrical load development uncertainty: Cand. Sci. (Techn.) Dissertation. 2005.
- *Morozov A.V.* Development of mathematical model for technical electric energy losses in rural distribution networks 10 kV: Cand. Sci. (Techn.) Dissertation. 2005.
- *Bokov D.G.* Choice and efficiency analysis of the means of increasing transfer capacity of inter-system ties in united electrical power systems: Cand. Sci. (Techn.) Dissertation. 2006.

- *Sazhenkov A.V.* Operational characteristics of long electric transmission lines with controlled shunt reactors: Cand. Sci. (Techn.) Dissertation. 2006.
- *Naumov I.V.* Development of means for generator stability improvement reactive power consumption: Cand. Sci. (Techn.) Dissertation. 2006.
- *Klimenko S.V.* Complex estimation of self-bearing isolated conductors during application in distributed 0,38-10 kV networks in regions with small load density with the account of initial information uncertainty (on example of Ioshkar-Ola electric nets: Cand. Sci. (Techn.) Dissertation. 2006.
- *Manatskov B.M.* Glaze-wind load norms determination in rural distribution electric networks: Cand. Sci. (Techn.) Dissertation. 2006.
- *Vorob'iov O.S.* Expert system for operational quality estimation for rural electric networks Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- «Mosenergo» company, Moscow
- RAO «EES Rossii», Moscow Joint stock compsnry UPS of Russia
- Division on supervision in electrical engineering, Moscow
- State Center on standards, certification and metrological support in electromagnetic compatibility area, Moscow
- VNIIE company, Moscow
- «Energosetproject», Moscow
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin, Moscow
- Moscow cable network
- Moscow electric net company
- «Elektrical controlled reaktors» company, Moscow
- Slovak Technical University. Bratislava, Slovakia
- Ilmenau Technical University, Germany

■ Unique equipment

- Electrodynamic model of electric power system
- Automated system for dispatcher control of distribution networks (technical facilities and software)
- Devices and systems for monitoring and analysis of electric energy quality

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At HVEEF department:
23 teachers,
13 researcher,
12 Ph.D. students.

Head of department Ph.D. (Techn.),
Alexey B. KALININ

■ Main Lines of Research

Research Supervisor

- **Investigation of electric discharge in gases**
Senior researchers Temnikov A.G., Sokolova M.V., Professor Vereschagin I.P.
- **Methods for modeling and calculation of electric fields**
Professor Vereschagin I.P., associated-professor Beloglovskiy A.A.
- **Lightning protection of constructions and energetic objects**
Associated-Professor Kuzhekin I.P., associated-professor Temnikov A.G.
- **Investigation of electric strength of high-voltage energy equipment**
Associated-Professor Pinal' Yu.S., Professor Krivov S.A.
- **Diagnostic methods for inherent insulation of high-voltage equipment**
Associated-Professor Pinal' Yu.S., Professor Krivov S.A.
- **Overvoltage in electric systems and protection against it**
Associated-professor Kondratov O.I., assistant Matveev D.A.
- **Scientific bases of electric discharge technological application, plasma technologies**
Professor Vereschagin I.P., Professor Krivov S.A. and senior researchers Sokolova M.V.
- **Development of high-voltage technology scientific bases for fine filtration and air disinfection**
Professor Krivov S.A., Professor Vereschagin I.P.

■ Agreements, contracts, projects supported by the state budget

- Development of typical program and complex inspection technique for power transformers (autotransformers) and shunting reactors
- Development of analysis technique for insulation absorption features of transformer equipment to estimate the moistening and residual resource
- Determination of sources and ways of interference transfer in measuring channels of gas turbine «Taifun» control system
- Technical examination of design solutions for lightning protection of gas-suction hole
- Experimental investigation of air ions source influence on structure and aerosol concentration in air variations in the model volume
- Experimental investigation of air-ionization influence on aerosol collection effectiveness from air flow
- Investigation of the main (final) discharge stage from artificial clouds of the charged water aerosol as the analogue of natural lightning main stage
- Market review of production-run filters and devices for interference suppression at present on voltage 0.4 kV with power from 1 W to 100 kW
- Investigation of volt-ampere characteristics of discharge electric filter gaps with new electrode configuration

- High-voltage source reconstruction for output voltage provision up to 250 kV of amplitude
- Experimental investigations of lightning protection systems and diagnostics of grounded device conditions for the various types of sub-stations
- Complex investigations of RIP insulation models of capacitor type
- Experimental investigations of grounded device conditions and lightning protection systems in order to electromagnetic interference elimination in technological equipment supply circuits at communication objects
- Testing and reliability inspection of high-voltage spray-type equipment
- Electric strength analysis for electric filter discharge gaps with new electrode configuration
- Experimental investigations of lightning protection systems and condition diagnostic of grounded devices for various sub-station types
- Experimental investigations of operative DC system diagnostics on Moscow region sub-stations
- Experimental investigations of RIP-insulation electric strength for the 110 kV lead-in Investigations of high-current and high-voltage forms of electric discharge and physical disruption mechanisms of liquid dielectrics for their disruptive voltage forecasting
- Laboratory setup creation for electric features research for discharge gaps of polymer electric filters
- Development and implementation of integrated academic-research structure MPEI-VEI. Electric energetic
- Investigation of corona discharge in air
- Development of new calculation methods and estimation of streamer corona influence on energy equipment operation for this influence reduction

■ Key publications

- *Electric* engineering encyclopedia. In 4 vol. / I.P. Vereschagin, I.P. Kuzhekin, B/K/ Maksimov etc.; under edition of A.F. D'yakov. V. 1: A—И. MPEI Publishing House, 2005. 316 p.
- *Electromagnetic* compatibility of electrical part of nuclear power plant / I.P. Kuzhekin, E.V. Vershkov, O.V. Sarypov etc. «Znak» Publisher, 2006. 300 p.
- *New technologies* for electric nets: papers collection / V.N. Varivodov, I.P. Vereschagin, A.V. Kalinin etc.; under edition of A.N. Rapoport, S.V. Serebriannikov. MPEI Publishing House, 2006. 218 p.
- *Beloglovskiy A.A., Vereschagin I.P.* Physical-mathematical modeling of pulse streamer corona in air // *Elektrichestvo*. 2005. No 2. P. 18—30.
- *Initial* electron accumulation process description in mathematical models of nanosecond steamer corona / A.A. Beloglovskiy, V.V. Timatkov, I.P. Vereschagin etc. // *Elektrichestvo*. 2006. No 3. P. 22—29.
- *Temnikov A.G., Orlov A.V., Bolotov V.N., Tkach Yu.V.* Experimental research of discharge features between artificial cloud of charged water aerosol and ground. Part 1. Optical and current features // *MPEI Vestnik*. 2005. No 1. P. 44—49.
- *Temnikov A.G., Orlov A.V., Bolotov V.N., Tkach Yu.V.* Spark discharge features research between artificial cloud of charged water aerosol and ground // *Zhurnal tekhnicheskoy fiziki*. 2005. V. 75. No. 7. P. 52—59.
- *Influence* of Solid Dielectric on the Impulse Discharge Behavior in a Needle-to-Plane Air Gap / A.G. Temnikov, V.V. Timatkov, G.J. Pietsch et. al. // *J. Phys. D: Appl. Phys.* 2005. Vol. 38. P. 877—886.

- *Temnikov A.G., Orlov A.V., Bolotov V.N., Tkach Yu.V.* Experimental investigation of discharge features between artificial cloud of charged water aerosol and ground. Part II. Spectral characteristics // MPEI Vestnik. 2005. No 3. P. 74–80.
- *Temnikov A.G., Orlov A.V., Bolotov V.N., Tkach Yu.V.* Studies of the Parameters of a Spark Discharge Between an Artificial Charged Water-Aerosol Cloud and the Ground // Technical Physics. 2005. Vol. 50. No. 7. P. 868–875.
- *Peculiarities* analysis of streamer corona in air using data bank on experimental characteristics of spark discharge corona stage / A.G. Temnikov, M.V. Sokolova, D.A. Matveev etc. // MPEI Vestnik. 2005. No 4. P. 48–55.
- *Temnikov A.G.* About the negative leader modeling in the air // Elektrotehnika. 2005. No 10.
- *Temnikov A.G., Orlov A.V.* Experimental investigation of streamer corona stalk features using the artificial cloud of charged water aerosol // Elektrichestvo. 2005. No 12. P. 14–21.
- *Roddatis V.K., Temnikov A.G., Smirnov Yu.M., Vereschagin I.P.* Physics of strong charged clouds formation and possibilities of their application // Proc. of Intern. conf. «Aerosols and safety», Obninsk, Russia, 2005. P. 160–162.
- *Orlov A.V., Temnikov A.G.* Accident rate analysis for electrical transmission lines with voltage 10...1150 kV in EES of Russia // MPEI Vestnik. 2006. No 3. P. 47–58.
- *Larin V.S., Lokhanin A.K., Matveev D.A.* Engineering calculation method for electric strength of high-voltage power transformer main insulation // Elektrichestvo. 2005. No 7. P. 82–85.
- *Bushuev S.A., Lokhanin A.K., Matveev D.A., Rabinovich V.L.* Overvoltage features caused at disconnection of furnace transformers by the vacuum switches // Elektrotehnika. 2005. No 10. P. 26–30.
- *Vereschagin I.P., Matveev D.A., Poblaguev I.A.* Estimation of efficiency indicators of increasing the lightning-surge protection of overhead lines with surge arresters // Elektrotehnika. 2005. No 10. P. 31–39.
- *Generator* of High-Voltage Impulses of Nanosecond Duration on the Basis of Double-Forming line / I.P. Kuzhekin, O.I. Kondratov, A.A. Nersessyan et. al. // Joint IEEE APS/ URSI/AMEREM Symposium, Albuquerque, USA. 2006. P. 577–580.
- *Sokolova M.V., Hulka L., Pietsch G.* Influence of a Bias Voltage on the Characteristics of Surface Discharges in Dry Air // Plasma Processes and Polymers. 2005. Vol. 2. P. 162–169.
- *Sokolova M.V., Krivov S.A.* Volume-Surface Discharge in Three-Electrode System as ion Source for Plasma Technologies // Intern. Conf. on Electromagnetic Devices and Processes in Environment Protection. ELMECO-5. Lublin (Poland) 2005. P. 63–64.
- *Streamer* corona features analysis in the air with usage of data bank on experimental characteristics / M.V. Sokolova, D.A. Matveev, V.V. Timatkov // MPEI Vestnik. 2005. No 4. P. 48–55.
- *Investigation of* Fine Structure of Surface Discharge in Air at Atmospheric Pressure / M.V. Sokolova, K.V. Kozlov, S.A. Krivov et. al. // Contr. Papers of 10-th Intern. Symp. on High Pressure Low Temperature Plasma Chemistry. 2006 Saga (Japan). P. 13–16.
- *Sokolova M.V., Krivov S.A.* Volume-Surface Discharge as an ion Source for Plasma Technologies // J. of Advanced Oxidation Technologies. 2006. Vol. 9. № 2. P. 164–169.

■ Partners

- «Federal net company of EES company», Moscow
- «Kaspiy Truboprovogny Consortium – R» company, Moscow

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- ❑ Branch of «SUEK» company. Leninsk- Kuznetskiy
 - ❑ Obninsk Center of science and technology
 - ❑ «NIIGAS» company, Moscow
 - ❑ «NPF ELNAP» company, Moscow
 - ❑ «Barkov Moskovskiy zavod Isoliator» company, Moscow
 - ❑ «NPF «Elstar» company, Moscow
 - ❑ State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin», Moscow
 - ❑ «Condor-Eco» company, Moscow
 - ❑ Lomonosov Moscow State University, Moscow
 - ❑ «Iskra Zashchita» company, Lubliana, Slovenia
 - ❑ Unique equipment
 - ❑ Generator of pulse voltage 1000 kV (certified)
 - ❑ Source of alternative current — WP 200/400 kV (certified)
 - ❑ Generator of lightning current four-component (certified)
 - ❑ Generator of charged aerosol
 - ❑ Setup for measurement of partial discharges in insulation
 - ❑ Generator of high frequency for 300 kV 100 kHz (GVCH 300/100)
 - ❑ Generator of nanosecond pulses with voltage 100 kV with pulse duration 300 ns (GIN 100/350)

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At RPAEPS department:

23 teachers,

3 researcher,

20 Ph.D. students.

Head of department Doctor of technical sciences, professor
corresp.-member of RAS Anatoly F. D'YAKOV

■ Main Lines of Research

Research Supervisor

- **Development of theoretical bases and implementation of integrated microprocessor systems of relay protection, automation, control and monitoring of ultra-high-voltage 330...750 kV energy objects**

Professor D'yakov A.F.

- **Development of methods and structure principles for simulators and automated educational systems on relay protection and energy system automation**

Professor D'yakov A.F., associated-professor Krivenkov V.V.

- **Microprocessor systems of relay protection and automation**

Associated-Professors Babykin V.V., Barabanov Yu.A., Vasiliev A.N.,
Klimova T.G., senior researcher Tiomkina R.V.

- **Software for short-circuit currents calculation and CAD systems for relay protection design**

Associated-Professor Barabanov Yu.A.

- **Electromagnetic compatibility of relay protection and automation microprocessor systems**

Professor Maksimov B.K., associated-professor Artsishevskiy Ya.L.

- **Complex method development for damage place detection means in electric transmission lines**

Associated-professor Artsishevskiy Ya.L.

■ Agreements, contracts, projects supported by the state budget

- Modeling methods development for damage processes in electric supply system of megapolis region with inherent power source
- Proposals development to provide the relay protection and automation devices reliability for generator-transformer units at concern «Rosenergoatom» objects
- Electric supply reliability and operation stability provision for technological installations at external electric supply violation

■ Key publications

- *D'akov A.F., Zhukov V.V., Maksimov B.K., Molodiuk V.V.* Management and marketing in electric power systems. — 2nd edition. MPEI Publishing House, 2005. 504 p.
- *Requirements* to electromagnetic compatibility conditions on electric system objects / A.F. D'akov, B.K. Maksimov, R.K. Borisov etc. «Energo-Progress» Publisher, 2005. 64 p.
- *Electrical* engineering encyclopedia. In 4 vol. / under edition of A.F. D'akov. V. 1: A—I. MPEI Publishing House, 2005. 316 p.

- *For the* first time in 500 kV net new shunting reactor 180 MVA controlled by superposed magnetization is introduced in exploitation / A.M. Brianzev, A.G. Dolgopolov, A.I. Lurie etc. // *Elektrichestvo*. 2006. No 8. P. 65—69.

■ Dissertations

- *Rusakova L.V.* Development of technique and transients investigation in measuring part of relay protection. Cand. Sci. (Techn.) Dissertation. 2005.

■ Partners

- «Institute Energosetproekt» company, Moscow
- FGUP «Russian State Concern on electric and heat energy at atomic stations», Moscow
- «Federal net company of united energy system», Moscow
- Federal State Unitary Enterprise «Atomenergoproekt», Moscow
- «ABB-Avtomatizatsiya», Moscow
- «El'ster-metronika», Moscow
- Scientific-Technical Center «Mekhanotronika» company, Sankt-Peterburg

■ Unique Equipment

- Setup for testing and adjustment of automatic synchronizers for connection of large power synchronous generators on parallel operation with energy system
- Software complex for automated design of relay protection devices

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At NCRES department:

18 teachers,

11 Ph.D. students (7 Russian, 4 foreign)

Head of department

Doctor of technical sciences,

Professor Leonid N. DUDCHENKO

■ **Main Lines of Research**

Research Supervisor

- **Theory and substantiation methods for installations and complexes parameters on the basis of renewable energy sources**

Professors Vissarionov V.I., Malinin N.K.

- **Theory and substantiation methods for installations and complexes operation modes on the basis of wind energy sources in the system of decentralized and centralized energy supply**

Professors Vissarionov V.I., Malinin N.K.

- **Ecological aspects of renewable energy sources usage**

Professors Vissarionov V.I., Malinin N.K.

- **Development of optimal control methods for hydroelectric power plant cascades with account of social-ecology requirements**

Professor Aleksandrovskiy A.Yu.

- **Seismic safety of hydro-engineering constructions**

Professors Dudchenko L.N., Marchuk L.N.

- **Development of theoretical bases for mode optimization and control system design for AC machines and their aggregates on the basis of non-conventional and renewable energy sources**

Senior researcher Tsgoev R.S.

- **Management of projects for complex organizational-technical systems creation on the basis of information and automation methods and facilities for the project solutions**

Professor Tyagunov M.G.

■ **Agreements, contracts, projects supported by the state budget**

- Investigations on typical modules creation for electric supply systems using non-conventional electric energy sources for application in robot-technical complexes
- Calculation technique development for housing electric supply system on the basis of ecologically friendly renewable energy sources
- Development of technique and software for electric energy production planning on hydro-power plants of Russia
- Development of methodic bases for substantiation of wind power complexes usage for local autonomous consumer energy supply
- Calculation and investigation of electric circuit of secondary supply sources for satellite repeater
- Development of energy potential estimation methods for storage pool of hydroeconomic purpose

■ Key publications

- *River-bed* regulation problems in low pools of Volga storage pools / A.Yu. Aleksandrovskiy, V.V. Ivanov, V.N. Korataev etc. // *Erossionnye i ruslovyie protsessy*. MSU Publisher. 2005. No 4. P. 98—126.
- *Vissarionov V.I., Pugachov R.V., Malinin N.K.* Effectiveness investigation for wind-diesel energy complexes // *Academia energetiki*. 2006. No 1. P. 8—13.
- *Vissarionov V.I., Lasarev-Marchenko S.A.* Photo-voltaic installations usage for power supply of floating aeration stations // Papers collection «Non-conventional and renewable energy kinds and methods of its storage» / under edition of R.I. Malashenko. — 1st edition. «CTS» at Bauman MSTU. MGTU Publisher. 2005. P. 78—79.
- *Vissarionov V.I., Lasarev-Marchenko S.A.* Floating aeration units with supply from solar batteries // *Renewable energy sources: Leading experts lectures* / under edition of V.V. Alekseev. MSU Publisher (geography faculty), 2005. No 3. P. 78—91.
- *Vissarionov V.I., Lasarev-Marchenko S.A.* Floating aeration installations with supply from solar photo-voltaic batteries for pond cleaning // *Stroi-profil'*. 2005. No 2. P. 29—35.
- *Vissarionov V.I., Lazarev-Marchenko S.A.* Les appareies navals d'aeration pour la purification des bassins d'eau fonctionnant des batteries photoelectriques // *Stroi-profil'*. 2005. No 6. P. 26—31.
- *Vissarionov V.I., Ryabikin A.D.* Technical solution review on re-equipment and modernization of hydro-power plants // *Gidrotekhnicheskioe stroitel'stvo*. 2006. No 1. P. 16—31.

■ Patents

- *Patent 52848 RF*. Solar aeration system / V.I. Vissarionov, D.N. Kunakin. 2006.
- *Patent 37576 RF*. Photo-voltaic device with concentrators / V.I. Vissarionov, A.V. Anistratov. 2005.

■ Dissertations

- *El' Khadge Hassan Abdalla*. Orientation of electric energetic development for Lebanon on the renewable energy sources application: Cand. Sci. (Techn.) Dissertation. 2005.
- *Pugachov R.B.* Calculation methods perfection for the main energy indexes and characteristic of wind-energy systems: Cand. Sci. (Techn.) Dissertation. 2006.
- *Benamer Abdellah*. Solar energy application for autonomous pumping stations supply in Maroc: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- «Institute Hidroproekt» company, Moscow
- «R&D Institute of energy constructions, Moscow
- All-Russia R&D Institute of agriculture economy electrification, Moscow
- Fach-Hoch Schule Konstanz, Germany

■ Unique equipment

- Floating aeration installation with supply from solar battery

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At TFEE department:

23 teachers,

5 Ph.D. students.

Head of department

Doctor of technical sciences,
professor, coresp.-member of RAS,
Winner of RF Government Award

Pavel A. BUTYRIN

■ Main Lines of Research

Research Supervisor

- **Theory and calculation methods of electromagnetic fields and electrical circuits**

Professor Demirchyan K.S.

- **Fundamental problems of energetic development influence on Earth global climate changing**

Professor Demirchyan K.S.

- **Theory and application practice of virtual instruments in electrical engineering**

Professor Demirchyan K.S.

- **UHF electrostatics**

Professor Alekseichik L.V.

- **Theory and realization of electrodynamic adaptive systems**

Professor Butyrin P.A.

- **Creation of adaptive electrodynamic systems for ozone electric synthesis**

Professor Gusev G.G.

- **Theory, methods and devices for electromagnetic energy conversion**

Associated-Professor Shakirzynov F.N./

- **Diagnostics and identification of electrical engineering and electrical energetic objects parameters**

Professor Butyrin P.A.

■ Agreements, contracts, projects supported by the state budget

- Search investigations on development of monitoring methods for electrical energy quality indexes, technical condition and functional readiness of electrical supply systems for military equipment under conditions of disturbing factor influence
- Development of theoretical bases of information technologies and knowledge bases application to continuous diagnostic of electrical engineering and electrical power equipment
- Development of theoretical bases of information technologies application for electric energy quality estimation in the tasks of electrical engineering equipment continuous diagnostic
- Local plasma-ionic formation modeling at strong discharge in energy equipment
- Development of theoretical bases and virtual tools for electrical engineering device parameters identification under loading

- Development and implementation of computer models for defects identification and disturbing place localization of electrical engineering and electrical energetic object parameters
- Development and implementation of non-contact electromechanical energy converters of unipolar type
- Theory development of destabilizing disturbance localization for electrical engineering and electrical power systems

■ Key publications

- *Demirchyan K.S., Zhokhova M.P.* Electrodynamics of conductors with current on Maxwell // *Elektrichestvo*. 2005. No 7. P. 41—51.
- *Shakirzyanov F.N.* Some problems of gigantic energy electrodynamics // Proc. of All-Russia Electrical Engineering Congress VELK—2005. 2005. P. 19—20.
- *Zolotukhin I.A., Karataev V.V.* Oscillation processes research in non-linear scheme models of thermal-hydraulic systems // *Ibid.* P. 27—29.
- *Butyrin P.A., Mareeva O.A.* Geometric form factor application for electromagnetic process quality estimation in three-phase systems // *Ibid.* P. 31—33.
- *Butyrin P.A., Vas'kovskaya T.A.* Diagnostics of electric circuit by parts // *Ibid.* P. 34—36.
- *Alpatov M.E.* Electric modeling as theoretical basis of transformer diagnostics // *Ibid.* P. 69—70.
- *Abrosimov L.I., Serebryannikov S.V., Shakirzyanov F.N.* Informatization principles for technological control of electric energetic of Russia // Proc. of Intern. conf. «information facilities and technologies» at Intern. Forum of Informatization. «Yanus-K» Publisher, 2005. V. 3. P. 5—8.
- *Zolotukhin I.A., Karataev V.V.* Experimental research automation of excitation conditions of chaotic oscillations in non-linear circuit on the basis of LabVIEW // *Ibid.* P. 111—114.
- *Sevostiannov A.O., Karataev V.V.* Piecewise linear operator application for transients research in simplest non-linear circuits in LabVIEW medium / *Ibid.* P. 115—118.
- *Gramm M.I., Shakirzyanov F.N.* Orthogonal transformations of state equations of potential field resistive models // *Elektrichestvo*. 2005. No 8. P. 41—47.
- *Mareeva O.A.* Geometric form factor application for electromagnetic process quality estimation in supply systems of electrical engineering installations. VI MSKAE 2005 // Proc. of VI Middle-European conf. «Computer methods and systems in automation and electrical engineering», Politechnika Czestochowska, Czestochowa — Poraj, 16—17 of Sept. 2005. P. 44—46.
- *Kisiliov A.N.* Circuits research of SPIN converter device with account of its functional purpose in energy system // All-Russia conf. of young specialists of RAO «EES Rossii». 2005. P. 76—86.
- *Gramm M.I., Shakirzyanov F.N.* Electrophysical models of complex economy // *Elektrichestvo*. 2005. No 3. P. 52—60.
- *Zolotukhin I.A.* Experimental research of oscillation processes in electric model of thermal-hydraulic system // Proc. of Intern. conf. «Educational, scientific and engineering applications in LabVIEW medium and National Instruments technologies». RUDN Publisher, 2005. P. 150—154.
- *Elistratova V.I., Karataev V.V.* Применение установки ELVIS setup and LabVIEW medium application for electric circuits research by symbolic method // *Ibid.* P. 196—199.

- *Sevostiannov A.O., Karataev V.V.* LabVIEW medium application for transients research in non-linear circuits with piecewise characteristics // Ibid. C. 346—349.
- *ELVIS* laboratory setup as the base for experimental research of course «Bases of circuit theory»: structure principles of laboratory workshop / T.A. Vas'kovskaya, V.I. Elistratova, I.A. Zolotukhin etc. . // Ibid. P. 351.
- *Butyrin P.A., Mareeva O.A.* Rigid mathematical models of electric circuits: splitting, parameter identification, disturbance localization // *Elektrichestvo*. 2006. No 12. P. 27—29.
- *Butyrin P.A., Mareeva O.A.* Geometric visualization of electric energy quality estimation // *Electro*. 2006. P. 31—32.
- *Modern* energetic bases. V. 2. Modern electric energetic bases / under edition of E.V. Ametistov. MPEI Publishing House. 2005. 368 p.
- *Butyrin P.A., Tolcheev O.V., Shakirzyanov F.N.* Electrical engineering. «Academia» Publisher, 2005. 420 p.
- *Physical* research and experiment automation: Computer measurements and virtual instruments on LabVIEW 7 basis / P.A. Butyrin, T.A. Vas'kovskaya, V.V. Karataev, S.V. Materikin etc. DMK-Press Publisher, 2005. 264 p.
- *Gramm M.I., Nemov Yu.N., Shakirzyanov F.N.* Spectral-matrix calculation methods in electrical engineering and losses minimum principle. MPEI Publishing House, 2006. 234 p.

■ Dissertations

- *Kiseliov A.N.* Mathematical models development of electrical circuits control elements for optimization problem solution: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Division of mechanics, machinery, control processes and energetic of RAS, Moscow
- Academy of Electrical Engineering sciences, Moscow
- «Ekologicheskii Centr zavoda Khrunicheva» company, Moscow
- United Institute of Nuclear research, Dubna
- Sankt-Peterburg State Technical University

■ Unique equipment

- Hardware-software complex LabVIEW

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At HM department:
78 teachers,
1 Ph.D. student.

Head of department
Doctor of physics-mathematics,
Profesor Igor M. PETRUSHKO

■ Main Lines of Research

Research Supervisor

- **Equations with partial derivatives**
Professor Petrushko I.M.
- **Homologous and structural ring theory and arithmetical properties of analytic function values**
Professor Tuganbaev A.A., associated-professor Yanchenko A.Ya.
- **Branching processes in random environment**
Associated-Professor Afanas'ev V.I.
- **Harmonic analysis, code theory, approximations**
Professor Yudin V.P.
- **Functional analysis**
Professor Kirillov A.I.
- **Asymptotic integration methods development for singularly perturbed differential, integral and integral-differential systems of linear and non-linear equations**
Professors Prokhorenko V.I., Safonov V.F., Bobodzhanov A.A.
- **Non-linear differential equations of infinite order and appropriate Banach spaces**
Professor Balashova G.S.
- **Inverse problems for differential equations**
Professor Barashkov A.S.

■ Agreements, contracts, projects supported by the state budget

- Some questions of qualitative theory of differential equations and function theory extreme problems
- Investigation of non-classical tasks for equation with partial derivatives in weight spaces

■ Key publications

- *Bobodzhanov A.A., Safonov V.F.* Singular perturbed integral—differential systems with contrast structure // *Matematicheskiiy sbornik*. 2005. V. 196. No 2. P. 29—56.
- *Guschin O.K.* About inherent smoothness of second-order elliptic equation solution // *Doklady RAS*. 2005. V. 404. No 1. P. 14—17.
- *Petrushko I.M., Kapitsyna T.V.* About first mixed problem for degenerating parabolic equations // *Non-classical equations of mathematical physics*. Novosibirsk, 2005. P. 207—218.
- *Tuganbaev A.A.* Multiplication Modules // *Journal of Mathematical Sciences (New York)*. 2004. T. 123. No 2. P. 3839—3905.

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- *Yudin V.A.* Design points distribution on sphere // Izvestia RAS. Series Mathematics. 2005. V. 69. No 5. P. 205—224.
 - *Higher* mathematics course. Integral calculus. Several variable functions. Differential equations: Lectures and practical training. Sankt-Peterburg: «Lan'» Publisher, 2006. 603 p.

■ Partners

- Lomonosov Moscow State University
- Steklov mathematical Institute of RAS, Moscow
- Moscow State Social University
- Russian scientific Center «Kurchatov Institute», Moscow

INSTITUTE OF AUTOMATIC AND COMPUTER ENGINEERING (IACE)

Institute Director **Ph.D. (Techn.), Associated-Professor
Valery P. LUNIN**

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- Institute departments**
- **Control and Informatics department (CI)**
 - **Computer Engineering department (CE)**
 - **Information-Measurement Technique department (IMT)**
 - **Electrical Physics department**
 - **Applied Mathematics department (AM)**
 - **Computers, Systems and Networks department (CSN)**
 - **Mathematical Modeling department (MM)**
 - **Electrical Engineering and Introscopy department (EEI)**

At CI department:
28 teachers,
11 researchers,
19 Ph.D. students.

Head of department
Doctor of technical sciences
Professor Valery M. BESEDIN

■ **Main Lines of Research**

Research Supervisor

- **Development of mathematical models and control algorithms for complicated objects**
Professor Derzhavin O.M.
- **Development of mathematical methods and automation facilities for investigation and design of non-linear dynamic systems and processes**
Professor Kolosov O.S.
- **Development of information technologies in real time on the basis of artificial neuron networks and self-organization principles**
Professor Filaretov G.F.
- **Automation facility development on the basis of modern programmable controllers, optimization and modeling of dynamic systems**
Professor Kolomeitseva M.B.
- **Development of adaptive and optimal control systems for complicated dynamic systems**
Professor Egorov S.V.
- **Investigation of decision making support methods on the basis of statistical analysis of heterogeneous data. Development of information protection methods**

Professor Borodiuk V.P., Associated-Professor Fomin G.A.

■ **Agreements, contracts, projects supported by the state budget**

- Development of instruments for investigation of linear and non-linear controlled objects
- Development of synergetic control algorithms for non-linear dynamic systems
- Development of model creation methods and controlled objects optimization on the observation data
- Development of synthesis methods for artificial neuron nets to detect the spontaneous variation of the random processes characteristics
- Development of parametric and structure identification algorithms of linear objects
- Development of mathematical and software provision for solving the imitation modeling problem of continuous dynamic systems with interval uncertainty
- Investigations of decision making support methods on the basis of statistical analysis of heterogeneous data

■ **Key publications**

- *Tolcheev V.O.* An approach to attraction of relevant scientific journals for researching // *Informatsionnye tekhnologii*. 2007. No 7. P. 65—71.
- *Yagodkina T.V.* Development of modal regulator on discrete models for multi-dimension dynamic object identification // *Izvestia TulGLJ*. Tula University Publisher. 2005. P. 106-Volume 3.

- *Avshalumov A.S., Filaretov G.F.* Detection and Analysis of Impulse Point Sequences on Correlated Disturbance Point // Internationales Wissenschaftliches Kolloquium, 10-13.09.2007. TU Ilmenau. Conference Proceedings. Vol. 5. pp. 17–21.
- *Anisimov D.N.* Laws of Dynamic Objects Parameters Estimates Distribution while Identification by the Method of Exponential Modulating // Problemy upravleniya. 2007. № 4. P. 14–18.
- *Informational* provision of economic information collection and analysis for budget planning fulfillment at educational institutions financing // A.V. Bobriakov, A.E. Zverev, M.M. Polotnov etc. // Proc. of Intern. conf. «Information means and technologies». 17–19 of Oct. 2006. Yanus-K Publisher, V. 1. P. 63–65.
- *Borodiuk V.P., L'vova A.V.* Determination technique of maximal protection level of information system under profitability criterion // Ibid. P. 79–82.
- *Kolomeitseva M.B., Kudnavtsev K.I.* Development of adaptive control system for rare-earth metal enrichment on the basis of fuzzy regulator // Ibid. P. 114–117.

■ Dissertations

- *Stefantsov A.G.* Development of adaptive information-analytic synthesis methodic. Cand. Sci. (Techn.) Dissertation. 2007.
- *Kokorev S.A.* Development and research of the method of simultaneous estimate of characteristic equation roots : Cand. Sci. (Techn.) Dissertation. 2007.
- *Smagina I.A.* Analysis of structures and development of electro-mechanical systems quality control methods: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- «Mosenergo» company, Moscow
- Institute of Radio Engineering and Electronics, RA5, Moscow
- Ilmenau Technical University, Germany
- Chemistry-Technological Institute, Pardubice, Czech Republic
- RIA «Mospetsavtomatika», Moscow
- RIA «Mars», Moscow

■ Unique equipment

- Tools package for neuron net investigation and design
- Hardware-software facilities for scientific research automation and equipment combined testing
- Equipment complex for investigation in real time of complicated dynamic objects with several nonlinear elements
- Technological equipment for investigation and design of automated control systems for technological processes

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At CE department:

25 teachers,

5 researchers,

10 Ph.D. students.

Head of department

Doctor of technical sciences,

Professor Viktor V. TOPORKOV

■ **Main Lines of Research**

Research Supervisor

□ **Distributed calculations and systems**

Professor Toporkov V.V.

□ **Automation of discrete system synthesis and technologies for joint hardware and software design**

Professor Toporkov V.V.

□ **Modeling, analysis and synthesis of dynamic systems**

Professor Chkhartishvili G.S.

□ **Logic design and variant synthesis**

Professor Potiomkin I.S.

□ **Design methods for memory devices and systems**

Professor Ognev I.V.

□ **Data bases development**

Professor Borodin G.A.

□ **System design on programmable logic integrated circuits**

Associated-Professor Sharapov A.P.

□ **Steganographics, methods and facilities for information safety provision**

Professor Toporkov V.V., Associated-Professors Andreeva I.N., Sharapov A.P.

□ **Intelligent systems**

Associated-Professor Fomina M.V.

■ **Agreements, contracts, projects supported by the state budget**

- Coordinated computing resources allocation in globally distributed medium
- Complex of models, methods, analysis and optimization means for scaled computing facilities
- Methods and instruments for joint design of hardware and software support
- Methods and facilities knowledge integration for creation of articles information models in accordance with CALS standards
- Steganographic and stegano-analysis in special applications
- Development of methods and technologies for automated investigations of hardware-software complexes for academic and research purposes
- Regularization of formally heuristic schedules for solution analysis and synthesis in investigation and design of complex systems
- High-level synthesis of digital systems in UNIX technologies
- Digital circuit synthesis on the basis of modern programmable LSI of arbitrary logic
- Development of CAD algorithms and units for LSI of arbitrary logic

- Investigation of element base, CAD systems and creation methods of fast-acting systems for analysis and information transmission on the basis of dynamically reconfigured FPGA
- Investigation and debugging of technique for including software modules prepared on universal languages into data base control system
- Outlet in intelligent systems

■ Key publications

- *Toporkov V.V.* Decomposition schemes of strategy planning synthesis in scaled systems // Izvesia RAS. Series Theory and control systems. 2006. No 1. P. 82–93.
- *Toporkov V.V.* Structure choice and resources distribution of computing systems of real time // Avtomatika i telemekhanika. 2005. No 1. P. 171–189.
- *Toporkov V.V., Toporkova A.S.* Measurement of execution time of fragmented programs // Programmirovaniye. 2005. No 3. P. 19–32.
- *Neder A., Pirogova M.* Arbotext — system for automated generation and maintenance of dynamically changed technical documentation // SAPR i grafika. 2006. No 2. P. 64–67.
- *Kraiushkin V.A., Leshikhina I.E., Neder A.V.* System Arbotext for heterogeneous documentation (publications) output automation necessary for manufacturing and exploitation maintenance of complex high-technology articles // Informatsionnye tekhnologii v proektirovanii i proizvodstve. 2006. No 2. P. 37–44.
- *Kulikov A.V., Fomina M.V.* Knowledge detection methods in data arrays containing noise // Proc. of Intern. conf. «Intellectual systems (IEEE AIS'06)» and «Intellectual CAD systems» (CAD-2006): Fismatlit Publisher, 2006. V. 1. P. 118–126.
- *Toporkov V.V.* Resources control at distributed calculations organization on the basis of reference plans // Selected reports of III Intern. conf. «Parallel calculations and control problems» RASO-2006: IPU RAS Publisher, 2006. P. 49–58.
- *Vagin V.N., Kulikov A.V., Berisha A.M., Fomina M.V.* Knowledge detection methods in noisy databases // Izvesia RAS. Series Theory and control systems. 2005. No 6. P. 163–168.
- *Kulikov A.V., Vagin V.N., Fomina M.V.* The Development of the Generalization Algorithm Based on the Rough Set Theory // XI-th Intern. Conf. KDS 2005. Proc. Vol. 1, FOI-Commerce, Sofia, 2005. P. 76–84.
- *Toporkov V.V.* Composition and Distribution of Resources for Real-Time Computing Systems // Automation and Remote Control. Vol. 66. No. 1. 2005. P. 154–169.
Toporkov V.V., Toporkova A.S. Measuring the Execution Time of Fragmented Programs // Programming and Computer Software. Vol. 31. No. 3. 2005. P. 123–132.
Kulikov A.V., Vagin V.N., Fomina M.V. Methods of Knowledge Discovery in «Noisy» Databases // J. of Computer and Systems Sciences Int. 2005. Vol. 44. No. 6. P. 973–978.

■ Dissertations

- *Md. Abdul Malek.* Symbols recognition in associative medium: Cand. Sci. (Techn.) Dissertation. 2005.
- *Solodovnikov A.Yu.* Development and investigation of methods for decision making support system application on the basis of fuzzy models in the problems of information-calculation network design: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Laboratory TIMA, Grenoble, France
- Russian Academy of Sciences, Moscow
- Russian Foundation of Fundamental Researches, Moscow
- Lomonosov Moscow State University, Moscow
- Ilmenau Technical University, Germany
- Enterprises of Russian
- Defense Ministry

■ Unique equipment

- Vantage Spreadsheet logical modeling system
- Synopsys high-level synthesis system
- Systems for digital devices development on the programmable logic IC MAXPlus II, Foundation Series
- GSSSystem for discrete systems structural synthesis
- MASS dynamic system modeling system
- ProENGINEER data engineering control system

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At IMT department:
24 teachers,
4 researchers,
5 Ph.D. students.

Head of department
Doctor of technical sciences, professor
Igor N. ZHELBAKOV

■ **Main Lines of Research**

Research Supervisor

- **Measuring facilities on the basis of digital signal processing**
Professor Zhelbakov I.N.
- **Investigation of delta-sigma ADC**
Professor Didenko V.I., associated-professor Solodov Yu.S.
- **Power transformer diagnostic**
Professor Malinovskiy V.N.
- **Intellectual pressure sensors with HART-protocol**
Associated-Professors Evlanov Yu.N., Shatokhin A.A.
- **Level and consumption measurements by ultrasonic methods**
Associated-Professor Novikov V.A.
- **Measurement systems for monitoring and diagnostic of high-voltage equipment**
Bykov A.P.
- **Electrical variables measurement in electric power systems**
Associated-Professor Shatokhin A.A., Makarychev P.K.

■ **Agreements, contracts, projects supported by the state budget**

- Cooperation and joint research-academic activity agreement with purposes of expert training on control systems between MPEI (TU) and Federal State Unitary Enterprise MARS
- Adjustment and calibration of magnetic thickness-meters MT2007
- Development of entry and telegram filtering mechanisms for account system of vacant car-tanks

■ **Key publications**

- *Electrical* engineering encyclopedia. In 4 vol. / under edition of A.F. D'yakov. V. 1.: A—I. MPEI Publishing House, 2005. 316 p.
- *Krug P.G.* Education on weight simulators // Mir transporta. 2006. No 3. P. 122—128.
- *Krug P.G.* Reliability estimate of mathematical software for car scales used in transport aviation // MAI Vestnik. 2006. V. 13. No 1. P. 62—70.
- *Tiukavin P.A., Tiukavin A.A.* Extreme bridge convergence for direct measurement of three-element RC two-terminal network parameters // Izmeritel'naya tekhnika. 2006. No 8. P. 26—30.

■ Partners

- MIDAUS company (Microelectronic sensoores and devices, Ul'yanovsk XENHUE KANGYU Control Systems Engineering INC, Ningbo, China Ilmenau technical university, Germany
- Concern Rosenergoatom branch «Smolensk nuclear power plant», Desnogorsk, Smolensk region.
- «North-West HEPP», Sankt-Peterburg
- Branches «Severodvinskaya HEPP-1» and «Severodvinskaya HEPP-2» of «Arkhangelskaya generiruiuschaya compania»
- «BureyaGidroElektroMontazh», Blagoveschensk
- «Bratskiy aliuminievy zavod», Bratsk
- «Tumen'energo», «Bashkirenergo», «Vologdaenergo», «Irkutskenergo»

■ Unique Equipment

- Software testing packet for analog-digital conversion in dynamic mode
- Strain-gauge measuring complex for composite materials diagnostics
- Secondary measuring transducer of LUSI-DI sensor
- Measuring system for technical parameters control of CAV transformers

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At EF department:
23 teachers,
3 researchers,
6 Ph.D. students.

Head of department Ph.D. (Techn.) Professor,
Yuri A. KAZANTSEV

■ **Main Lines of Research**

Research Supervisor

- **Development of digital systems for quality and electric energy quantity monitoring in high-voltage power nets**
Professor Kazantsev Yu.A., associated-professor Gevorkian V.M.
- **Development of calculation and design methods of compact passive and active devices of UHF range**
Professor Kazantsev Yu.A., associated-professor Gevorkian V.M.
- **Electromagnetic compatibility of electric and power engineering equipment**
Professor Kazantsev Yu.A., associated-professor Gevorkian V.M.
- **Development and investigation of algorithms for digital information processing systems**
Associated-Professor Borodkin E.A.
- **Digital technologies of information safety**
Associated-Professor Rytov A.A.
- **Synthesis methods for multi-dimension multi-speed systems**
Professor Mironov V.G., Associated-Professor Chobanu M.K.

■ **Agreements, contracts, projects supported by the state budget**

- Investigations of multi-dimension signal coding and image recovering with high resolution from several coded images with low resolution
- Investigation of determination approaches for consumer contribution in the electric energy quality distortion in the structure of combined measuring equipment in high voltage nets
- Development and creation of integrated research-academic structure MPEI – VEI. Electrical physics. Energy savings
- Development of C-range filters
- Development of C-range coaxial-wave-guide transfer
- Investigation and development of electromagnetic field numerical calculation methods in complicated electrodynamic systems
- Development of new affective multi-dimension multi-speed systems

■ **Key publications**

- *Complex* measuring device for automated account system for quantity and quality monitoring of electrical energy in high-voltage nets / A.B. Bunin, S.V. Vishniakov, V.M. Gevorkyan etc. // Elektro. 2005. No 1. P. 32–38.
- *Mikhailin S.N., Gevorkyan V.M.* Problems of digital signal processing in the automated quality and account monitoring system for electric energy quantity // MPEI Vestnik. 2005. No 1. P. 86–92.

- *Mikhailin S.N., Gevorkyan V.M.* Precision frequency measurements for fundamental harmonic of polyharmonic signals // MPEI Vestnik. 2005. No 2. P. 115—118.
- *Vishniakov S.V., Gevorkyan V.M.* Development method for adaptive finite-element fragmentation based on multi-dimension digital filtering // MPEI Vestnik. 2005. No 1. P. 80—85.
- *Vishniakov S.V., Gevorkyan V.M.* Problem of calculation models creation at field analysis in complicated resonance systems // Proc. of World Electrical Congress VELK-2005. 2005. P. 36—37.
- *High-level* power filter of L-Xc range on the dielectric resonators / A.B. Bunin, S.V. Vishniakov, V.M. Gevorkyan etc. // Proc- of Intern. Crimean conf, Ukraine, Sevastopol, V 2. P. 509—510.
- *Noise* immunity of complex measuring device of automated monitoring system for electric energy quality in 100 kV and higher nets / A.B. Bunin, S.V. Vishniakov, V.M. Gevorkyan etc. // Proc. of IX Russian conf. on electromagnetic compatibility EMC-2006, 20-22 of Sept., Sankt-Peterburg: VITU Publisher. 2006. P. 222—226.
- *Chobanu M.K., Batluk A.V.* Investigation of filter bank application for image compression // Digital signal processing. 2005. No 4. P. 29—40.
- *Chobanu M.K., Maksimenko I.E.* Synthesis of double-channel multi-dimensional wavelets and their application for image compression // MPEI Vestnik. 2006. V. 2. P. 88—96.
- *Chobanu M.K., Chernikov A.V.* Modern method of image compression on the basis of wavelet transform and hierarchic coding algorithm // Digital signal processing. 2005. No 3. P. 40—59.
- *Chernikov A.V., Chobanu M.K.* Optimization and development of SPIHT algorithm / / Proc. of VII Intern. conf «Digital signal processing and its application» —DSPA-2005. V. 2. P. 354—357.
- *Mitra S., Tchobanou M., Bryukhanov M.* A General Method for Designing Sparse Antenna Arrays // Proc. ECCTD-2005 «European Conference on Circuit Theory and Design. Cork, Ireland», 2005, 29 August—2 September. P. 118—133.
- *Tchobanou M.* Multidimensional Nonseparable Multirate Systems – a New Tool for Signal Processing // Proc. Intern. Wissenschaftliches Kolloquium Technische Universitat Ilmenau, September 11—15. Ilmenau, Germany, 2006. P. 89—90.

■ Patents

- *Patent 2248074 RF.* Pass-band filter / A.V. Bunin, S.V. Vishniakov, V.M. Gevorkyan, Yu.A. Kazantsev. 2005.
- *Patent 2259619 RF.* Pass-band filter / A.V. Bunin, S.V. Vishniakov, V.M. Gevorkyan, Yu.A. Kazantsev. 2005.
- *Patent 51789 RF.* Pass-band filter / A.V. Bunin, S.V. Vishniakov, V.M. Gevorkyan, Yu.A. Kazantsev, V.I. Polukarov. // BI. 2006. No 6.
- *Patent 53073 RF.* Pass-band filter / A.V. Bunin, S.V. Vishniakov, V.M. Gevorkyan, Yu.A. Kazantsev, V.I. Polukarov, S.N. Mikhailin // BI. 2006. No 12.
- *Authors certificate No 2005610014 about official registration.* «Program for creation of adaptive finite-difference and finite-element fragmentation for plane-parallel tasks «Agrid2D» / S.V. Vishniakov, V.M. Gevorkyan, Yu.A. Kazantsev / registered at program List of computer programs, 2005.
- *Authors certificate No 2005610015 about official registration.* «Program for creation of adaptive finite-difference and finite-element fragmentation for 3D tasks «Agrid3D» / S.V. Vishniakov, V.M. Gevorkyan, Yu.A. Kazantsev / registered at program List of computer programs, 2005.

■ Partners

- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin». Moscow
- State Unitary Enterprise «R&D Institute of Automatic», Moscow
- Federal State Unitary Enterprise «Special Design Bureau of MPEI», Moscow
- Tsinghua University, Beijing, China
- Norway University of Science and Technology, Trondheim, Norway
- State Unitary Enterprise «Girikond», Sankt-Peterburg
- State Unitary Enterprise «KB Luch», Rybinsk
- «Ceramics» company, Sankt-Peterburg
- Technological University of Tokio, Japan
- Technological University of Tampere, Finland California University at Santa-Barbara, USA

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At AM department:
57 teachers,
8 researchers,
9 employees of academic staff,
20 Ph.D. students.

Head of department
Doctor of technical sciences, Professor,
Winner RF President Award
Alexander P. EREMEEV

■ **Main Lines of Research**

Research Supervisor

- **Fundamental problems of artificial intellect**
Professors Vagin V.N., Eremeev A.P.
- **Methods, languages and systems of parallel programming. Mathematical and software support of modern computing systems, complexes and networks**
Professor Kutepov V.P.
- **Mathematical and software support of intellectual systems: control and decision making support systems, expert systems, teaching systems etc.**
Professors Vagin V.N., Eremeev A.P., Plesnevich G.S.,
Associated-Professor Varshavsky P.R.
- **Non-classic logic and calculation models (logic of possibilities, fuzzy sets, neuron nets) for intellectual systems, multi-agent systems**
Associated-Professors Averkin A.N., Tarasov V.B.
- **Software provision of modern information systems and networks, technologies INTERNET/INTRANET**
Associated-Professor Chernov P.L., Lukyanova T.V.
- **Technology of development and verification of software means, information resources protection**
Associated-Professor Maran M.M.
- **Development, investigation and application of graph models**
Associated-Professor Kokhov V.A., Neznanov A.A.
- **Modern control theory**
Associated-Professor Akchurin R.M.

■ **Agreements, contracts, projects supported by the state budget**

- Investigation and development of semiotic models of knowledge representations and methods of authentic and reliable outlet in intellectual systems of decision making
- Development of semiotic systems for decision making support systems on the basis of non-traditional logic approach
- Development of models, methods, languages and software for cluster systems
- Theoretical fundamentals development for information and network technologies in teaching and decision making
- Development of theoretical basis for structural informatics

■ Key publications

- *Eremeev A.P., Varshavskiy P.R.* Decision search on the basis of analogies and precedents in intellectual systems for decision making support, Russian Science: Bright dream: Collection of papers / under edition of V.M. Konov. «Oktopus» Publisher, 2006. 392 p.
- *Eremeev A.P., Varshavskiy P.R.* Decision search on the basis of structural analogy for intellectual systems of decision making support, // Izvestia RAS. Series Theory and control systems. 2005. No 1. P. 97–109.
- *Eremeev A.P., Troitskiy V.V.* Temporal outlet realization in intellectual systems of decision making support // MPEI Vestnik. 2005. No 1. P. 69–79.
- *Eremeev A.P., Varshavsky P.R.* Analogous Reasoning for Intelligent Decision Support Systems // Proc. XI-th Intern. Conf. «Knowledge-Dialog-Solution» (KDS 2003), June 20-30, 2003, Varna (Bulgaria), FOI-COMMERCE, Sofia, 2005. P. 272–279.
- *Eremeev A.P., Kurilenko I.E.* Temporal arguments realization for intellectual system of decision making support in real time // Programmnye producty and systems. 2005. No 2. P. 8–16.
- *Eremeev A.P., Varshavsky P.* Analogous Reasoning and Case-Based Reasoning for Intelligent Decision Support Systems //Intern. Journal «Information Theories& Applications». 2006. Vol. 13. № 4. P. 316–324.
- *Vagin V., Fomina M., Kulikov A.* The Development of the Generalization Algorithm Based on the Rough Set Theory // Ibid. № 3. P. 255–262.
- *Vagin V., Averin A.* The Development of Parallel Resolution Algorithms Using the Graph Representation // Ibid. № 3. P. 263–271.
- *Vagin V.P., Os'kin P.V.* Heuristic and probability methods of effective indications taking down in diagnostic systems // Izvestia RAS. Series Theory and control systems. 2006. No 4. P. 78–93.
- *Vagin V.P., Akchurina N.R.* Parallel solution tables processing for recognition task // Proc. of X National conf. on artificial intelligence KII–2006. Fismatlit Publisher, 2006. V. 1. P. 294–302.
- *Vagin V.P., Os'kin P.V.* Usage of multi-agent approach in diagnostics on the base of device models // Ibid. V. 2. P. 608–616.
- *Vagin V.N., Oskin P.V.* The Heuristic Methods of Obtaining the Effective Measurements in Diagnostic Systems, Knowledge-based Software Engineering // Proc. of the 7th Joint Conf. on Knowledge-Based Software Engineering, E. Tyugu and T. Yamaguchi (Eds), IOS Press, 2006. P. 307–316.
- *Vagin V.N., Akchurina N.R.* Parallel Preprocessing for Classification Problems in Knowledge Discovery Systems», Knowledge-based Software Engineering // Ibid. P. 275–284.
- *Kutepov V.P., Lazutkin V.A., Liang Liu, Osipov M.A.* The Means of Flowgraph Stream Parallel Programming for Clusters // Intern. Symposium on Distributed Computing and Applications to Business Engineering and Science. 2006. Vol. 1. Shanghai University Press.
- *Bazhanov S.E., Kutepov V.P., Shestakov D.A.* Functional parralel programming language and its implementation on cluster systems // Izvestia RAS. Series Programmirovanie. 2005. No 6. P. 18–51.
- *Bazhanov S.E., Vorontsov M.N., Kutepov V.P., Shestakov D.A.* Structural analysis and planning of parallel program processes // Izvestia RAS. TISU. 2005. No 6. P. 131–146.

■ Dissertations

- *Neznanov A.A.* Methods and software means for distinguishing of graph model system fragments: Cand. Sci. (Techn.) Dissertation. 2005.
- *Lopatnikova V.B.* Hybrid methods perfection for intellectual systems of decision making support: Cand. Sci. (Techn.) Dissertation. 2005.

■ Dissertations

- *Aiman Bezisha.* Research and Development of Extraction Knowledge Methods for Creating Intelligent Decision Support Systems: Cand. of Sci. (Techn.) Dissertation, 2006.
- *Paul Os'kin.* Research and Implementation of Truth Maintenance Systems for Diagnostic Problems: Cand. of Sci. (Techn.) Dissertation, 2007.

■ Partners

- Computing center of RAS, Moscow
- Institute of software systems, RAS, Pereyasvl'-Zalesskiy
- Institute of control problems, RAS, Moscow
- Institute of system analysis, RAS, Moscow
- Russian R&D Institute of information technologies and computer-aided-design, Moscow
- Center of information-analytical education of distant education system of Ministry of Education, Moscow
- Institute of cybernetics of Academy of Sciences of Ukraine, Kiev

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At CSN department:
31 teachers,
2 researchers,
14 Ph.D. students.

Head of department Cand. Sci. (Techn.),
Associated-Professor
Alexander F. KRIUKOV

■ Main Lines of Research

Research Supervisor

- **Network computer technologies. Development of models, performance estimation and parameter measurement for computer network units, its representation**
Professor Abrosimov L.I.
- **Computer and network systems for knowledge evaluation**
Associated-Professor Afonin V.A.
- **Application of modern applied software packets for modeling and design of computer engineering facilities**
Associated-Professor Balashov V.N.
- **Algorithms and compression methods for halftone images**
Associate-Professor Gol'tsov A.G.
- **Design and creation of fault-tolerant computer networks**
Associate-Professor Danilin G.G.
- **Modeling of multi-processor computer systems. Design of microprocessor systems for object control**
Associate-Professor Deriugin A.A.
- **Search of new architecture principles for computer systems implementation. Data integration and knowledge extraction. Development of educational technologies**
Professor Dzegelionok I.I.
- **Database design**
Associated-Professor Dolotov V.G.
- **Speech technologies and teaching process automation**
Associated-Professor Evseev A.I.
- **System design on the basis of modern micro-controllers**
Associated-Professor Ivanov A.V.
- **Design of microprocessor control systems**
Associated-Professor Kaporsky A.V.
- **Development of Intranet**
Professor Kriukov A.F.
- **Information security. Modern cryptography. Electronic digital signature. Electronic money. Steganography and stegano-analysis**
Professor Melnikov Yu.N.
- **Investigation of modern principles for parallel data processing. Development of fault-tolerant computing systems**
Professor Ladygin I.I.

- **Calculation models and computing systems architecture**
Associated-Professor Morokhovets Yu.E.
- **LINUX network administration. Compact and built-in operating systems. Web-systems using distributed databases**
Associated-Professor Osadchiev A.A.
- **Design and modeling automation for digital systems on the basis of the equipment description languages VHDL and VERILOG**
Associated-Professor Poliakov A.K.
- **Synergetics**
Associated-Professor Fadeev N.N.

■ **Agreements, contracts, projects supported by the state budget**

- Technique for interaction problems solution of the microprocessor systems in distributed networks
- Calculation organization in promising scaled systems of conveyer data processing
- Development and investigation of asynchronous conveyer data processing models
- Development and investigation of new methods for halftone image compression with fast reconstruction
- Application possibility research for modeling facilities of abstract multi-conveyer systems for analysis and optimization real manufacture conveyers

■ **Key publications**

- *Abrosimov L.I.* Performance measurement technique of corporative computing systems // Electronic journal «Computing networks. Theory and practice» 2005. No 2(7), 6. 1, <http://network-journal.mpei.ac.ru>.
- *Abrosimov L.I.* Local networks and Internet for business organization and management. Section of textbook «New information technologies in small business practice» / / Businessman library: «Yanus-K» Publisher, 2006.
- *Dzegelionok I.I.* Network educational technologies and working technique in Internet/Intranet // Experimental academic authors program: Research Center of problems of expert training quality, 2005. 32 p.
- *Kalinina G.A., Morokhovets Yu.E.* Calculations organization in promising special systems for data conveyer processing // Proc. of XIV Intern. seminar «Modern technologies in problems of control, automation and information processing». Alushta. Samara State air-space university Publisher, 2005. P. 247—248.
- *Dzegelionok I.I., Mazurenko A.K., Otsokov Sh.A.* Approach to numerical reproduction of alternative energetic models // Coll. of papers to 85-anniversary of All-Russia Electrical Engineering Institute / under edition of V.D. Kovaliov. VEI Publisher, 2006. P. 107—112.
- *Ladygin I.N., Yankov S.G.* Modeling task solution by time intervals on cluster computing system // Proc. of Intern. conf. «Informational systems and technologies»: «Yanus-K» Publisher, 2006. V. 2. P. 200—202.
- *Mel'nikov Yu.N., Koloshein Yu.A.* Possibilities of banking information detection in text files // Banking technologies. 2006. No 5. P. 49—52.

■ **Dissertations**

- *Abdulradkh Odai Abdullatif.* Investigation of multi-computer system effectiveness with usage of decomposition model of distributed calculations organization: Cand. Sci. (Techn.) Dissertation. 2005.

- *Belykh A.A.* Single-chip micro-controller architecture unification and its application for development of built-in system software: Cand. Sci. (Techn.) Dissertation. 2005.
- *Shirokov V.L.* Development of models and methods for estimation and parameter choice of multi-server information exchange systems: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin», Moscow
- Institute of information transfer problems, RAS, Moscow
- Institute of microprocessor systems, RAS, Moscow
- Research-technological center of Russian Banks Association, Moscow
- Design Bureau of informatics, hydro-acoustics and communication, Moscow
- Research-Industrial Company «Agrostoi», Moscow Consulting IT company «Sterling Group», Moscow
- Research Center IBM Deutschland, Heidelberg. Germany Ilmenau Technical University, Germany
- Dresden Technical University, Germany

At MM department:
35 teachers,
17 Ph.D. students.

Head of department
Doctor of Physical and Mathematical sciences,
Professor Andrey A. AMOSOV

■ **Main Lines of Research**

Research Supervisor

- **Non-standard models of mathematical physics and methods of their investigation (non-linear analytical problems of variation type, Clifford analysis, investigation of viscous gas dynamic models etc.)**

Professors Amosov A.A., Dubinskiy Yu.A., Zlotnik A.A.

- **Numerical methods for solution of mathematical physics problems and systems of quasi-linear equations for dynamics of viscous compressible media with data nonsmooth**

Professors Amosov A.A., Zhileikin Ya.M., Zlotnik A.A.

- **Mathematical modeling of discrete systems: implementation of large algebraic structures in computing algebra, coding, cryptographic, decision making and diagnostic**

Professor Frolov A.B., associated-professor Meschaninov D.G.

- **Mathematical and informational provision of economic activity**

Professor Frolov A.B., Associated-Professor Akhmetshin A.A.,

Associated-Professor Zaslavskiy A.A.

- **Statistical methods of digital information processing, methods of its optimization**

Professors Goritskiy Yu.A., Ishmukhametov A.Z.

- **Intellectual systems for recognition, data bases**

Associated-Professors Zubov V.S., Kniazev A.V.

■ **Agreements, contracts, projects supported by the state budget**

- Systems of equations system for viscous compressible flows and for radiation heat exchange
- Investigation of non-classical problems of mathematical physics
- Multi-dimensional complex boundary value problems (models development and their investigation)
- Implementation of calculations in finite algebraic structures in the context problems of information security and images recognition

■ **Key publication**

- *Amosov A.A.* Global solvability of one non linear non stationary problem with a non local boundary condition of radiative heat transfer type // Differential equations. 2005. V. 41. No 1. P. 96—109.
- *Amosov A.A., Dmitriev V.V.* Application of circulant preconditioned conjugate gradient method for numerical solution of the heat transfer integral equation // MPEI Vestnik. 2005. No 6. P. 5—24.
- *Goshev I.A.* Finite-difference scheme for the problem of one-dimensional motion of viscoelastic plastic body with Prandtl-Ishlinskiy operator // MPEI Vestnik. 2005. No 6. P. 82—100.

- *Mario Ahues, Andrei Amosov, Alain Largillier, Olivier Titaud.* Lp Error Estimates for Projection Approximations // Applied Mathematics Letters. 2005. Vol. 2. N 4. P. 381—386.
- *Andrey Amosov, Grigory Panasenko.* Asymptotic Analysis and Asymptotic Domain Decomposition for an Integral Equation of the Radiative Transfer Type// Journal de Mathematiques Pures and Appliques. 2005. Vol. 84. No 5. P. 1813—1831.
- *Ducomet B., Zlotnik A.* Viscous Compressible Barotropic Symmetric Flows With Free Boundary Under General Mass Force. Part I: Uniform-in-time bounds and stabilization // Math. Meth. Appl. Sci. 2005. Vol. 28. N 7. P. 827—863.
- *Zlotnik A.A., Dukomet B.* Problem of symmetrical equilibrium of compressible barotropic flows with free boundary under general mass force // Doklady Mathematics. 2005. V. 401. No 2. P. 134—139.
- *Zlotnik A.A., Dukomet B.* Lyapunov functional for symmetrical flow of viscous barotropic liquid with the free boundary under general mass force // Doklady Mathematics. 2005. V. 402. No 1. P. 14—19.
- *Ducomet B., Zlotnik A.* Lyapunov Functional Method for 1D Radiative and Reactive Viscous Gas Dynamics // Arch. Rational Mech. Anal. 2005. Vol. 177. N 2. P. 185—229.
- *Ducomet B., Zlotnik A.* Stabilization and Stability for the Spherically Symmetric Navier-Stokes-Poisson System // Applied Mathematics Letters. 2005. Vol. 18. N 10. P. 1190—1198.
- *Zlotnik A.A., Ducomet B.* Stabilization of one-dimensional flow of radiative and reactive viscous gas for general reaction speed // Doklady Mathematics. 2005. V. 403. No 6. P. 731—736.
- *Zlotnik A.A., Ducomet B.* Stabilization speed and stability of viscous compressible symmetric barotropic flows with free boundary for total mass force // Matematicheskiy sbornik. 2005. V. 196. No 12. P. 33—84.
- *Zaslavskiy A.A., Spivak A.V.* Flea and grasshopper theorem / Matematicheskoe prosveschenie. 2005. No 9. P. 215—217.
- *Goritskiy Yu.A., Raftopulo A.Yu., Shevchenko O.V.* About accuracy of object location on sphere on the basis of results of difference-range finding measurements for satellite systems at high orbits // MPEI Vestnik. 2005. No 2. P. 102—109.
- *Galkin P.A., Meschaninov D.G.* Solution method for a linear equations sistem over residue ring with uncertainty in coefficients // MPEI Vestnik. 2005. No 6. P. 121—128.
- *Cherepova M.F.* On estimates of parabolic potentials higher derivatives for the high order equation // MPEI Vestnik. 2005. No 6. P. 109—120.
- *Zubov V.S., Shevchenko I.V.* About pyramidal sorting status // MPEI Vestnik. 2005. No 3. P. 89—94.
- *Zubov V.S., Shevchenko I.V., Kraskov V.V.* AVL+-tree – new representation of balanced binary tree // MPEI Vestnik. 2005. No 5. P. 91—95.
- *Krasnogorskiy A.M.* Decomposition of many complex variables functions into the sum of analytic andcoanalytic components // MPEI Vestnik. 2005. No 6. P. 42—58.
- *Bredikhin R.N.* About one approach to recognition of symbol optical images // MPEI Vestnik. 2005. No 2. P. 134—141.
- *Bredikhin R.N.* Class library for logic modeling on the basis of finite topology principle // MPEI Vestnik. 2005. No 5. P. 101—110.
- *Dubimskiy Yu.A.* Some complex decompositions of Sobolev spaces W_p^m and Dirichlet problem for the Cauchy-Riemann system // MPEI Vestnik. 2005. N 6 P.101—120.

- *Amosov A.A., Goshev I.A.* Existence and uniqueness of global wear solutions to the equations describing the longitudinal oscillations of a viscoelastoplastic Ishlinskiy material // Doklady Mathematics. 2006. V. 410. No 1. P. 7—11.
- *Amosov A.A., Vestfalskiy A.E.* Finite-difference scheme for two-scale homogenized equations of one-dimensional motion of thermoviscoelastic Voigt-type body // Comp. Math. and Math. Phys. 2006. V. 46. No 4. P. 691—718.
- *Goshev I.A.* Global single-valued solvability to two-scale homogenized problem of Ishlinskiy toplastic viscoelastic body longitudinal vibrations // MPEI Vestnik. 2006. No 6. P. 82—100.
- *Zlotnik A.A., Zlotnik I.A.* Stability criterion of small disturbances for quasi-gas-dynamic equation system // Comp. Math. and Math. Phys. 2006. V. 46. No 2. P. 251—257.
- *Bolotov A.A., Gashkov S.B., Frolov A.B., Chasovskikh A.A.* Elementary introduction to elliptical cryptography // Algebraic and algorithmic bases: Komkniga Publisher, 2006. 324 p.
- *Bolotov A.A., Gashkov S.B., Frolov A.B.* Elementary introduction to elliptical cryptography // Cryptographic protocols on elliptic curves: Komkniga Publisher, 2006. 274 p.
- *Bolotov A.A., Meschaninov D.G., Frolov A.B.* Algebraic Structures: MPEI Publishing house, 2005. 80 p.
- *Dubinskiy Yu.A.* Decomposition of spaces W_p^m and $D_p^{m,k}$ into sum of solenoidal and potential sub-spaces and factorization inequalities // Doklady Mathematics. V. 408, 2006. No 2. P. 160—164.
- *Dubinskiy Yu.A.* Dirichlet Problem for Cauchy-Riemann system in scales W_p^m and \dot{W}_p^m // Doklady Mathematics. 2006. V.408. No 6. P. 727-729/
- *Krasnogorskiy A.M.* On decomposition of harmonic function space and some applications // Doklady Mathematics. 2006. V. 411. No 4.
- *Krasnogorskiy A.M.* About unsolvability of the complex divergent equation in Sobolev space // MPEI Vestnik. 2006. No 6. 7 P. 76—82.
- *Bulychova O.N., Bulyshov P.E., Zakharov V.A.* Game theory methods application for the search of some kind of simulation for marked transfer systems of transitions with restricted validity // MPEI Vestnik. 2006. No 6. P. 5—9.
- *Gashkov S.B., Frolov A.B., Shilkin S.O.* On some invert conversion and division algorithms with in finite rings and fields // MPEI Vestnik. 2006. No 6. P. 20—31.
- *Dubinskiy Yu.A.* On smoothing property of solenoidal factorization // MPEI Vestnik. 2006. No 6. P. 49—51.
- *Zubov V.S., Fal'k V.N.* New algorithm for quick sorting by selecting approach // MPEI Vestnik. 2006. No 6. P. 62—68.

■ Dissertations

- *Krasnogorskiy A.M.* About solvability of some boundary problems in domains with nonsmooth boundary: Cand. Sci. (Phys.Math.) Dissertation. 2006.
- *Raafat Machrouz Mohammed Ahmed.* Dual solution methods for the optimal control problems for hyperbolic systems: Cand. Sci. (Phys.Math.) Dissertation. 2006.

■ Partners

- Lomonosov Moscow State University, Moscow
- Computing Center of RAS, Moscow
- Institute of Hydrodynamics of RAS Siberian branch, Novosibirsk

- Institute of computational mathematics of RAS, Moscow
- Institute of mathematical modeling of RAS, Moscow
- Kazan State university
- Freiberg Mining Academy, Germany
- Mathematical Institute at Berlin Free University, Germany
- Normal Polytechnic School, Lyonne, France
- Rostov State University, Rostov-on-Don
- Institute of mathematics, Czech Academy of Sciences, Prague
- Jean Monnet University, Saint-Etienne. France

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At EEI department:
20 teachers,
3 researchers,
8 Ph.D. students.

Head of department Ph.D. (Techn.),
Associated-Professor Valery P. LUNIN

■ **Main Lines of Research**

Research Supervisor

- **Mathematical modeling of electromagnetic procedures, algorithms for diagnostic signal analysis, defect classification and parameterization procedures**
Associated-Professor Lunin V.P.
- **Fulfillment techniques and data analysis of magnetic non destructive testing and technical diagnostic**
Professor Pokrovskiy A.D.
- **Eddy current defect detection and structure-scopy methods**
Associated-Professor Chernov L.A.
- **Development of non-destructive testing devices and its application technique**
Professor Sukhorukov V.V.
- **Methods and technologies of computer aided education for electrical engineering disciplines**
Associated-Professor Kuznetsov E.V.

■ **Agreements, contracts, projects supported by the state budget**

- Algorithms investigation and software development for detection, classification and estimation of defect parameters for NPP steam-generator heat-exchange tubes using the results of eddy current testing
- Development of preprocessing algorithms for diagnostic information analysis for inside-tube magnetic defectoscope for oil- and gas tubes testing
- Development of theoretical and experimental design bases for eddy-current, magnetic and electric potential means for product inspection
- Analysis methods development for diagnostic images and pattern recognition on the basis of neuron net technologies
- Design of matrix transducers for eddy-current and magnetic non-destructive testing
- Development and manufacture of magnetic defectoscopes for steel rope control and vortex-current devices for metallization thickness control of printed boards

■ **Key publications**

- *Lunin V.P.* Phenomenological and algorithmic methods for solution of electromagnetic testing inverse problems // Defektoskopia. 2006. No 6. P. 3–16.
- *Pokrovskiy A.D.* Magnetic methods of non-destructive testing: MPEI Publishing House, 2006. 72 p.
- *Lunin V.P.* Double-step algorithm of finite-element solution of the electromagnetic testing. Electric capacitance testing // Defektoskopia. 2006. No 12. P. 52–61.

- *Lunin V.P.* Double-step algorithm of finite-element solution of the electromagnetic testing. Eddy-current testing // Defektoskopia. 2006. No 12. P. 62—69.
- *Software* development and implementation for detection and classification of heat-exchange tube defects for NPP steam generators with reactors WWER-440 and WWER-1000 / V.P. Lunin, A.G. Zhdanov, R.O. Uscherbov etc. // Proc. of V Intern. conf. «Safety, effectiveness and economic of nuclear energetic»: Concern Rosenergoatom Publisher, 2006. P. 245—248.
- *Software* for detection and parametrization of tube defects using eddy-current testing data for WWER steam generators / V.P. Lunin, A.G. Zhdanov, R.O. Uscherbov etc. // Proc. of VII Intern. seminar on horizontal steam generators. Podol'sk, 2006. P. 51—59.
- *Lunin V.P., Zhdanov A.G., Kulagina E.G.* Effective algorithms for eddy-current signals processing of heat-exchange tube testing for WWER steam generators // Ibid. P. 60—68.
- *Lunin V.P., Zhdanov A.G., Lazutkin D.Tu.* Design of neuron net defects classifier for multi-frequency eddy-current testing of heat-exchange tubes // Ibid. P. 69—76.
- *Lunin V.P.* Engineering Approaches to Solving Inverse Electromagnetic Testing Problems // Summer School «Advanced Aspects of Theoretical Electrical Engineering» Sozopol, Bulgaria, 2005. P. 133—144.
- *Zhdanov A.G., Lunin V.P.* Approximating Function for Suppression of Unwanted Signals in Eddy Current Data // Ibid. P. 145—150.
- *Lunin V., Zhdanov A.* Inversion of Eddy Current Field Data for In-service Inspection of WWER Steam Generator Tubes // 51st Intern. Scientific Colloquium: Proc. Ilmenau, Germany, 2006. P. 135—136.
- *Pokrovskiy A.D., Meleshko N.V.* Electromagnetic Fields Simulation in Technical Diagnostics // Proc. of 9th European Conf. on NDT, Berlin, 2006.
- *Lunin V., Zhdanov A.* Automated Data Analysis in Eddy Current Inspection of Steam Generator Tubes // Ibid.

■ Partners

- Federal State Unitary Enterprise «Russian State Concern on electrical and heat production on nuclear power plants, Moscow
- R&D and Design Institute of assembling technologies, Moscow
- Technical diagnostic center «DISCAN», Lkhovitsy
- RIA «Gidropress», Podol'sk, Moscow region
- «Masinostroitelny zavod «ZiO Podol'sk», Podol'sk, Moscow region
- Moscow RIA «Spektr»
- RosTekhNadzor Rossii
- Bauman Moscow State Technical University
- Federal Institute of investigation and materials testing, Berlin, Germany
- Non-destructive Testing Center, Iowa University, USA
- Fraunhofer Institute of non-destructive testing, Saarbrucken, Germany
- Ilmenau Technical University, Germany
- Fach-Hochschule Konstanz, Germany

■ Unique equipment

- Eddy-current defectoscope with through-pass axial and matrix transducers for non-ferromagnetic tube testing
- Magnetic defectoscopes for steel wire rope testing

- ❑ Metallization thickness meter for printed boards
- ❑ Eddy-current defectoscope for crack detection in loaded details
- ❑ Magnetic indicator for estimation of magnetic testing mode for steel details
- ❑ Software for automated system of heat-exchange tube eddy-current testing for NPP steam generator with WWER-440 and WWER-1000
- ❑ Software for finite-element analysis of electromagnetic field, transducer design and diagnostic signal processing
- ❑ Educational and testing programs on electric and magnetic circuits, electromagnetic devices, electronics

INSTITUTE OF RADIO ENGINEERING AND ELECTRONICS (IREE)

Institute Director

**Doctor of technical science, professor
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The Institute consists of two Faculties:

**Radio Engineering Faculty of (REF)
Electronics Faculty of (EF)**

Dean of Radio Engineering Faculty Departments of the Faculty:

**Doctor of technical science, professor
Nicolay N. UDALOV
Ph./fax: (495) 362-7309
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**Generation of Oscillations and Signals department
(GOS)
Fundamentals of Radio Engineering department
(FRE)
Radio Receivers department (RR)
Radio Systems department (RS)
Antennas and Radio Waves Propagation depart-
ment (ARWP)
Radio Devices department (RD)
R&D division «Gyromagnetic Radio Engineering»
(GRE)
Academic-Research Center «Modern Radio Engi-
neering and Telecommunication Technologies»
(MRETT)**

Dean of Electronics Faculty

**Ph.D. (Techn.) Associated-Professor
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EF Departments:

**Fabrikant Physics department (FP)
Electronic Devices department (ED)
Lighting Engineering department
Industrial Electronics department (IE)
Semiconductor Electronics department (SE)**

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At GOS department:
15 teachers,
6 Ph.D. students.

Head of department
Doctor of technical sciences,
Professor Nikolay N. UDALOV

■ Main Lines of Research

Research Supervisor

- **Synchronization systems for communication channels with complex signals**
Professor Udalov N.N.
- **Investigation of phase and amplitude fluctuations in precision signal formation devices and in its functional units**
Professor Kuleshov V.N.
- **Frequency synthesis, radio engineering measurement and secretive communication systems using the complex and chaotic signals**
Professors Belov L.A., Kapranov M.V.
- **Oscillations sources in microwave and millimeter-wave ranges with extremely low phase noise**
Professor Tsarapkin D.P.
- **Power units design for semiconductor UHF electronics**
Associated-Professor Koptev G.I.
- **Frequency filters in signal generation devices**
Associated-Professor Bogachiov V.M.
- **Measuring and communication devices of millimeter wave-length range**
Senior researcher Khriunov A.V.
- **Optoelectronic devices**
Professor Vorob'iov V.I.

■ Agreements, contracts, projects supported by the state budget

- **Generation of complex signals with precision parameters**
- **Investigation and development of noise-immune secretive communication systems on the bases of ultra-wide-band and chaotic signals**
- **Design and development of stable frequency and signal synthesizers**
- **Investigation and development of low-noise miniature transistor UHF oscillators with electronic frequency control**
- **Investigation and development of UHF oscillation sources with extremely high frequency stability**

■ Key publications

- *Belov L.A.* Stable frequency and signal formation: Academia Publisher, 2005. 224 p.
- *Boldyreva T.I.* New Development of PM and AM Noise Analysis in Crystal Oscillators: an Influence of 1/f Noise Sources // Proc. of 19-th European Frequency and Time Forum, Besancon. France, 21–24 March, 2005.

- *Tsarapkin D.P.* Resistive coupling in microwave frequency stabilization // Ibid.
- *Tsarapkin D.P.* Microwave interferometer with increased bandwidth // Ibid.
- *Kuleshov V.N.* New Development of PM and AM Noise Analysis in Crystal Oscillators: an Influence of Wideband Noise Sources // Ibid.
- *Kuleshov V.N.* Oscillators: Stability, Tuning, Noise // Proc. of Intern. Symp. on Signals, Circuits and Systems. Vol. 2. — Iasi, Romania, July, 14–15 2005. P. 397–402.
- *Boldyreva T.I., Kuleshov V.N.* PM and AM Noise in Emitter Current Source Biased BJT Amplifiers // Ibid. P. 557–560.
- *Egorov V.M., Kuleshov V.N.* Perspective Microelectronic DTCXO's Using Piecewise Polynomial Interpolation // VIII Intern. Conf. for Young Researchers «Wave Electronics and Its Application in the Information and Telecommunication Systems». St-Petersburg, 2005. P. 72–73.
- *Dronov D.V.* Inaccuracies of Frequency Domain Processing of Information Ground Penetrating Chirp Waveform Radar Signal // Ibid. P. 99.
- *Kuleshov V.N., Boldyreva T.I.* PM and AM Noise Analysis in Cristal Oscillators // 16- th Conf. «RADIOELEKTRONIKA-2006», Bratislava, Slovakia, 2006. P. 1–4. Tomashevskaya M.V. Spline Approximation Method Application for Reconstruction of Discrete Maps Function // Abstracts of Intern. Symp. NDES-05, Potsdam, Germany. 2005. P. 150.
- *Tomashevskiy A.I., Kapranov M.V.* Fractal Distribution of Reverse Iterations in Maps with Chaotic Dynamics // Ibid. P. 151.
- *Tomashevskaya M.V., Tomashevskiy A.I.* Theshold Effect in the Problem of Piecewise- Linear Map Function Reconstruction // Proc. NDES'2006, Dijon, France. P. 173–176.
- *Tomashevskiy A.I.* Formation of Fractal Structures in 3-segment Piecewise-Linear Map in Reverse Time // Ibid. P. 177–180.
- *Tomashevskiy A.I., Kapranov M.V.* Fractal Properties of the Reverse Nonlinear Piece- wise-Quadratic Map // XXV Dynamics Days Europe'2005, 25-28 July 2005, Berlin, Germany. Book of abstracts Europhysics Conf. Series. Vol. 29E. P. 95–96.
- *Tomashevskaya M.V.* Spline-Approximation Application for Reconstruction of Discrete Maps // Ibid. P. 96–97.
- *Tsarapkin D.P.* Phase Noise in Microwave Bridge Oscillators // Program of 2005 Joint IEEE Intern. Freq. Cont. Symp. & PTTI Sys. & Appl. Meeting, 29–31 Aug. 2005, Vancouver, Canada. P. 106.
- *Tsarapkin D.P.* On Optimization of a Frequency Discriminator for a Low Phase Noise Microwave Oscillator With Combined Stabilization // Ibid. P. 107.
- *Tsarapkin D.P.* Phase Noise in Microwave Bridge Oscillators // Ibid.
- *Tsarapkin D.P.* Treatment of Flicker Noise in Oscillators and Methods of its Suppression // Conf. intern. IEEE «FCS'2006», Miami, USA, 2006. P. 100–105.
- *Tsarapkin D.P., Kozlov S.S.* Impact of Stabilizing Networks on Phase Noise in Microwave Bridge Oscillators // Ibid. P. 105–111.
- *Baskakov A.I., Dronov D.V., Min-Ho Ka.* Calculation technique for permissible FM oscillator non-linearity of geo-radar // Elektrotekhnicheskie i informatsionnye komplekсы i sistemy. 2006. No 3. P. 55–59.
- *Belov L.A.* Hittite — the company portrait // Elektronika: Nauka, Tekhnologia, Biznes. 2005. No 8. P. 46–52.
- *Belov L.A.* Mini-Circuits — corporation profile // Elektronika: Nauka, Tekhnologia, Biznes. 2005. No 6. P. 38–43.

- *Belov L.A.* UHF components of MITEQ company // Elektronika: Nauka, Tekhnologia, Biznes. 2005. No 4. P. 44–49.
- *Belov L.A., Dronov D.V.* Nonlinear effects at amplitude-phase conversion in power amplifier of satellite re-translator // Radiotekhnika. 2005. No 11. P. 97–99.
- *Belov L.A.* UHF signals switchers // Elektronika: Nauka, Tekhnologia, Biznes. 2006. No 1. P. 20–25.
- *Belov L.A.* Attenuators of UHF signals // Elektronika: Nauka, Tekhnologia, Biznes. 2006. No 2. P. 36–41.
- *Belov L.A.* Solid-state amplifiers of low and medium power // Elektronika: Nauka, Tekhnologia, Biznes. 2006. No 5. P. 46–55.
- *Belov L.A.* Powerful amplifiers of ultra-high frequencies // Elektronika: Nauka, Tekhnologia, Biznes. 2006. No 6. P. 3–8.
- *Belov L.A., Khil'kevich V.* Oscillators with dielectric resonators for the frequency stabilization // Elektronika: Nauka, Tekhnologia, Biznes. 2006. No 7. P. 54–59.
- *Belov L.A., Zhitnikova M.V.* Micro-electro-mechanic components of RF range // Elektronika: Nauka, Tekhnologia, Biznes. 2006. No 8. P. 4–10.
- *Belov L.A., Dronov D.V.* RF subsoil sounding of imperfections with the help of ultra-wide-band linear FM signals // Trudy RNTORES named after Popov. Seria Svarkhshirokopolosnye signaly i sverkhkorotkir impil'sy v radiolokatsii, cviazi i akustuke, 2005. No. 1. P. 101–103.
- *Belov L.A., Dronov D.V.* Discretization frequency choice at the time-frequency processing of subsurface linear FM radar signal // Ibid. 2006. No. 1. P. 489–493.
- *Dronov D.V.* FM law error influence on the characteristics of subsurface sounding radar // Radiotekhnicheskie tetradi. 2005. No 32. P. 31–33.
- *Dronov D.V.* Errors of informational signal processing for linear FM geo-radar in frequency domain // Ibid. 34–36.
- *Bogachiov V.M., Solomatina D.A., Shalukha A.N.* Synthesis, frequency and transfer responses of polynomial filters // Proc. of 60-th scientific session of RNTORES named after Popov, 2005. V. 2. P. 113–115.
- *Bogachiov V.M., Demidov V.M., Shalukha A.N.* Polynomial filter synthesis with inclined amplitude-frequency responses // Ibid. P. 116–118.
- *Vziatyshv V.F., Kuleshov V.N., Lebedev I.V., Tsarapkin D.P.* UHF electronics in MPEI // Radiotekhnika. 2005. No 3. P. 27–29.
- *Kuleshov V.N., Perfil'ev A.A., Boldyreva T.I.* Amplitude and phase fluctuations calculation in oscillators with voltage control // Elektrosvaz. 2005. No 6. P. 27–29.
- *Tomashevskiy A.I., Kapranov M.V.* Fractal properties of chaotic dynamic processes in reversed time // Radiotekhnika. 2006. No 4–5. P. 214–237.
- *Tsarapkin D.P.* Phase noise in bridge UHF oscillators // Radiotekhnika. 2006. No 3.

■ Patents

- *Patent 47525 RF.* Vectorial phase modulator // V.N. Kuleshov, A.E. Mordvinov. 2005.
- *Patent 43704 RF.* Signal modulator / L.A.Belov // BI. 2005. No 3.

■ Dissertations

- *Bortsov A.A.* Opto-electronic oscillator HF and UHF ranges controlled in frequency with pumping by quantum-dimensional laser diode: Cand. Sci. (Techn.) Dissertation. 2005.

- *Dronov D.V.* Subsurface sounding of roadway using linear FM signals: Cand. Sci. (Techn.) Dissertation. 2006.

■ **Partners**

- Federal State Unitary Enterprise «Osoboe konstruktorskoe buro MPEI», Moscow
- Korean Polytechnic university, Seoul
- Moscow Aviation Institute (State Technical University)
- Moscow Technical University of Communication and Informatics
- Scientific-Industrial Association «Vega», Moscow
- Federal State Unitary Enterprise «Orion», Moscow
- State Unitary Enterprise «All-Russia Electrical Institute named after Lenin», Moscow
- Federal State Unitary Enterprise «Russian R&D Institute of Space Instrument-Making», Moscow
- Institute of Radio Engineering and Electronics of Russian Academy of Sciences, Moscow
- Sankt-Peterburg State Electrical University
- «Lit-FONON» company, Moscow
- Nizhegorodskiy State Technical University, N. Novgorod
- «Microsystems», Moscow region

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At FRE department:
26 teachers,
5 researchers,
7 Ph.D. students.

Head of department Ph.D.
Associated-Professor,
Viacheslav A. GRECHIKHIN

■ **Main Lines of Research**

Research Supervisor

- **Investigations of acoustic properties of thin-film and laminated materials**
Senior researcher Zhgoon S.A.
- **SAW (Surface Acoustic Wave resonators for the materials with natural unidirectivity)**
Senior researcher Zhgoon S.A.
- **Sensors on the basis of acoustic wave devices**
Senior researcher Zhgoon S.A.
- **Development of digital signal processing in laser systems for flow velocity measurement**
Associated-Professor Grechikhin V.A.
- **Optical detector characteristic investigations on the base of the commercial devices with charge coupling and development of image processing methods**
Senior researcher Razumov L.A.
- **Development of processing methods for wide-band signals in ultrasonic flaw inspection**
Professor Kartashov V.G.
- **Physics and technology of open dielectric waveguides, functional units and circuits: electrodynamic phenomena investigations and devices design**
Professor Vziatyshev V.F.
- **Class of devices and circuits of millimeter range based on the semi-shielded dielectric waveguides: new tools for knowledge organization and for the operation with knowledge during its investigations and design**
Professor Vziatyshev V.F.
- **Synthesis and implementation of probing wave formations for radio interferometry of gas-dynamic processes: description conception, approach to experimental investigations and probing device creation on the basis of the dielectric waveguides**
Professor Vziatyshev V.F.
- **Development of functional devices for signal processing**
Associated-Professor Shtykov V.V.
- **Development of medical diagnostic apparatuses on PC basis**
Associated-Professor Shtykov V.V.
- **Passive radar system development on PC basis for guard systems**
Associated-Professor Shtykov V.V.

- **Development of universal measuring complex on PC basis for laboratory work execution for lecture courses of electrical and radio electronics profile**

Associated-Professor Shtykov V.V.

- **Development of methods and equipment for signal processing and analysis in the medical diagnostic area**

Associated-Professor Kramm M.N.

- **Development of automated hardware-software complexes for investigations of radio engineering models and objects characteristics**

Associated-Professor Pollak B.P.

- **Development and investigations of microwave devices on highly-anisotropic materials**

Associated-Professor Pollak B.P.

- **Investigations of physical and technical properties of composite materials on the basis of highly-anisotropic ferrites and creation of microwave and millimeter devices on their basis**

Associated-Professor Pollak B.P.

■ **Agreements, contracts, projects supported by the state budget**

- Development and investigation of computer algorithms for measuring information analysis in laser systems of liquid, gas and plasma flow diagnostics
- Wavelet analysis methods study for the flow visualization using computer modeling
- Development of methods for small disturbance zones allocation of myocardium electric activity with its sizes and co-ordinates determination (creation of electro-cardio-tomograph)
- Theoretical and experimental investigation of surface acoustic wave propagation in laminated materials on anisotropic substrates
- Development of design principles and investigation of transmission line element characteristics on the basis of the dielectric waveguides in millimeter wavelength range
- Investigation of dielectric waveguiding structure of 3-mm band radio interferometry and enterprise choice for technological implementation of dielectric waveguide lot production
- Investigation and optimization of probing device functional units on the dielectric wave-guiding structures with implementation of the required amplitude-phase responses
- Investigations of methods and means for information transmission and processing with usage of electromagnetic, optical and acoustic waves
- Investigation of acoustic wave propagation, technology elaboration, sample structures investigation, manufacturing and testing the samples based on this basis, investigation of the deposition process and sample manufacturing process

■ **Key publications**

- *Zhgoon S.A., Shvetsov A.S.* Controllable Trimming Of SAW Filters And Resonators on Langasite and Lithium Tantalate // Proc. of EFTF 2005, Besancon, March 2005.
- *Zhgoon S.A., Barinov A.E., Shteynberg O.M., Mozhaev P.B.* Small RF Filters Made with Thin-Film High Temperature Superconductors // Ibid.

- *One-port* SAW Resonators using Natural SPUDT Substrates / D.P. Morgan, S.A. Zhgoon, A.S. Shvetsov et. al. // Proc. of Intern. Ultrasonics Symposium 2005, September 2005, Rotterdam. P. 444—449.
- *Morgan D.P., Zhgoon S.A., Shvetsov A.S.* One-port SAW Resonators using Natural SPUDT Substrates. For submission to IEEE Trans. UFFC (issue 2006), 14 pages.
- *Koleshko V.M., Gulay A.V., Shevchonok A.A., Zhgun S.A.* Fluoride Compound Targets for the Sputter Deposition of Thin Films of High-Tc Superconductors // Technical Physics Letters. 2006. Vol. 32. No. 2. P. 158—160.
- *Koleshko V.M., Gulay A.V., Shevchonok A.A., Zhgun S.A.* Sputtering targets from fluoride compounds for obtaining the thin films of high-temperature superconductors / / Pis'ma v ZHTF. 2006. V. 32. No 4. P. 45—50.
- *Design* problems of one-port resonators with natural unidirectivity / A.C. Shvetsov, S.A. Zhgoon S.A., G.D. Lobov etc. // Proc. of XIV Intern. conf. on spin electronics and gyrovector electrodynamics, 2005. P. 344—358.
- *Single* Port SAW Resonators Design for Arbitrary Reflection Phase / S.A. Zhgoon, A.S. Shvetsov, O.M. Shteynberg et al. // Proc. of Intern. Ultrasonics Symp. 2006, October 2006, Vancouver.
- *The Microwave* Sensor of Small Moving for the Active Control of Vibrations and Chaotic Oscillations Modes / V.A. Fedorov, S.M. Smolskiy, A.V. Mizirin et. al. // The 7th Intern. Conf. on Vibration (ICOVP—2005) ISIK University, Istanbul, Turkey, Eds: E.Inan & A. Kiri. 2005. P. 193—202.
- *Grechikhin V.A., Razumov L.A., Savchenko E.V.* Analysis of the Digital Algorithms of PIV-images Processing by Computer Simulation // Proc. of SPIE. 2005. Vol. 6262. P.626205-1—626205-8.
- *Shalimova E.V.* Synthesized aperture method application in ultrasonic flaw inspection // MPEI Vestnik. 2005. No 6. P. 151—155.
- *Kartashov V.G., Zaliotkin A.V., Shalimova E.V., Sokolov I.V.* Optimal and quasi-optimal time signal processing at ultrasonic flaw inspection of materials with complex structure and frequency-dependent damping // MPEI Vestnik. 2006. No 6. P. 140—146.
- *Yumatov E.A., Kramm M.N., Nabrodov A.B.* Informational expert system for objective estimation of the emotional stress // Biomeditsinskie tekhnologii i radioelektronika. 2005. No 1. P. 3—7.
- *Kramm M.N., Nabrodov A.B., Yumatov E.A.* Informational system and methodology of objective estimation of person emotional stress // Nadiozhnost. 2006. No 1. V. 16. P. 44—52.
- *Lebedev V.V., Kramm M.N., Zhikhareva G.V.* Effectiveness estimation for electrode placing at co-ordinate measurement of dipolar myocardium sources // Meditsinskaya tekhnika. 2006. No 1. P. 5—8.
- *Lebedev V.V., Kramm M.N., Zhikhareva G.V.* Estimation of Electrode Efficiency in Measurement of Coordinates of Dipolar Myocardium Sources // Biomedical Engineering. 2006. Vol. 40. № 1. P. 4—6.
- *Zhikhareva G.V., Skachkov V.L.* Algebraic method for reconstruction of the equivalent surface source of heart bio-electric activity // Proc. of VII Intern. conf. «Physics and radio electronics in medicine and ecology — PREME —2006»: Vol.1. Vladimir: Sobor Publisher, 2006. P. 137—139.
- *Zhikhareva G.V.* Sources reconstruction of myocardium electrical activity malfunctions by spectral and algebraic methods // Appendix to journal «Otkrytoe obrazovanie»:

Proc. of XXXIII Intern. conf. and discussion scientific club «Informatsionnye tekhnologii v nauke, sociologii i biznese IT+SE'06». Autumn session. Zaporozh'e national university Publisher, 2006. P. 204—206.

- *Puchin S.V.* Hardware-software instrumentation for investigation of gyromagnetic objects in millimeter range // Proc. of XIII Intern. conf. on spin electronics. 2005. P. 121—130.
- *Vziatyshev V.F.* Noo-problems of sustainable development: friendly technologies and innovational education // Proc. Intern. conf. «Via libraries to the future». Two volumes. Part 2: School library, 2005. P. 173—191.
- *Vziatyshev V.F., Annenkov V.V., James Pitt, Shiyon A.A.* Social technologies of knowledge and information operation: in auditorium, in class, in network // Ibid. P. 192—210.
- *Vziatyshev V.F.* Noo-sphere and sustainable development ideas: the place of design approach and social technologies //RAEN Vestnik. XXI — 15 years: paper collection: «Internet Engineering», 2005. P. 52—62.
- *Vziatyshev V.F., Kolin K.K., Krasnova L.I., Magaril S.A.* Humanitarian technologies, innovation activity and engineering education // Proc. of Intern. Symposium «Quality of higher education and specialist training to the professional activity», Moscow, 9—11 of Nov. 2005. Tomsk: Tov Technical University Publisher, 2005. P. 115—118.
- *Vziatyshev V.F., Barskiy B.G., Krasnova L.I., Magaril S.A.* Socio-cultural basis of innovational activity // Proc. of conf. on UNESCO Program «Education for everybody», Moscow, 2005.
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■ Patents

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- *Krutskikh V.V.* Functional units on semi-shielded dielectric waveguides: Cand. Sci. (Techn.) Dissertation. 2005.
- *Shalimova E.V.* Spatial-time processing of wide-band signals in ultrasound flaw inspection: Cand. Sci. (Techn.) Dissertation. 2005.
- *Tochilin D.A.* Intergrated complex for automated investigations of radio engineering objects: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- RF MD company, Greensboro, North Carolina, USA
- Fomos-Materials company, Moscow
- Elionica company, Sankt-Peterburg
- Nancy University, France
- Sensor Technologies Ltd company, UK
- Impulse Consulting Ltd company, UK
- «R&D Institute of precision devices», Moscow
- «VNIIMP-VITA» company, Moscow

■ Unique equipment

- The technological complex for manufacturing of electronic devices on the basis of metal, dielectric and high-temperature superconducting film materials prepared by vacuum deposition and photolithography
- The automated measuring setup for research of cryogenic UHF devices characteristics
- The measuring complex for the frequency and temperature characteristics measurements for SAW devices on the basis of Agilent E5070A and probe heads Pycoprobe.
- Hardware-software bench for research of characteristics of electrical signals and circuits

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At RR department:
23 teachers,
9 researchers,
8 Ph.D. students.

Heads of department
2005 — Doctor of technical sciences,
Professor Sergey M. SMOLSKIY
2006 — Doctor of technical sciences,
Professor Yuri A. GREBENKO

■ Main Lines of Research

Research Supervisor

- **Informational-telecommunicational support of efficiency and reliability of electrical networks and systems**

Professor Smolskiy S.M., Professor Grebenko Yu.A.

- **Development of promising radar methods and means for high-precision remote measurements of vibrations and small displacement of power engineering equipment elements**

Professor Smolskiy S.M.

- **Development of radio measuring systems and devices for energy producing branches**

Professor Smolskiy S.M., Professor Bogatyrev Ye.A.

- **Development of spatially distributed systems for information acquisition, storage, remote transmission and processing**

Professors Bogatyrev Ye.A., Grebenko Yu.A.

- **System engineering design of microelectronic devices**

Professor Grebenko Yu.A.

- **Digital complex filters**

Professor Grebenko Yu.A.

- **Development of construction principles and technical means for efficient local informational-telecommunicational complexes for the executive personnel of the operative services**

Senior researcher Savkov N.N.

- **Investigation of system engineering and circuit engineering solutions at development of specific radio receivers**

Senior researcher Savkov N.N.

- **Development of new principles and hardware-software facilities for the remote diagnostics of person functional conditions**

Senior researcher Fedorov V.A.

- **Development of radio frequency identification devices for the access checking systems**

Researcher Trofileev A.A.

- **Development of efficiency and reliability of technical facilities for the remote functioning monitoring of distributed reference devices of guard radio complex «MEGAPOLIS RK»**

Senior researcher Filatov V.A.

- **Development of multi-criteria methods for object comparison and choice in the homogeneous varieties**

Professor Kandyrin Yu.V.

- **Development of methods and algorithms for variants ordering at various competence degree about the object technical characteristics**
Professor Kandyrin Yu.V.
- **Development and investigation of cooler choice method for processor cooling**
Professor Kandyrin Yu. V.
- **Development of queuing methods for radio electronic equipment withdrawal to repair on the basis of technical quality indexes**
Professor Kandyrin Yu.V.
- **Constructive methods to provide the electromagnetic compatibility in radio electronic systems**
Professor Pokrovskiy F.N.
- **Unit repair technology perfection of modern household radio electronic equipment and development of approaches and technical facilities for effective servicing**
Professor Bogatyrev Y.A., senior researcher Filatov V.A.

■ **Agreements, contracts, projects supported by the state budget**

- Development principles for effectiveness increasing of information-measuring systems
- Development of modern promising technologies for effectiveness increasing of local informational-telecommunicational radio complexes of wide applications
- Investigations of structure conception and search of promising circuit engineering solution for the special radio receiver with large dynamic range
- Development of portable measuring complex for the remote diagnostics of person functional condition
- Development of restricted access device into apartment house
- Development of device for non-contact data collection and transmission
- Providing the effectiveness and reliability of technical facilities for remote functioning monitoring of distributed reference devices of guard radio complex «MEGAPOLIS-RK»
- Development of methods, algorithms and software for multi-criteria variant choice
- Development of methods for partial and linear objects ordering at queuing its repair
- Perfection of repair technologies for the modern household radio electronic units and development of technique and technical facilities for effective servicing

■ **Key publications**

- *Autodyne* FM radar of millimeter range with continuous emission / S.M. Smolskiy, S.D. Votoropin, N.N. Savkov etc. // Tekhnologia i konstruirovaniye v elektronnoy apparature. Odessa: Neptun-Technology Publisher, 2005. No 1(55). P. 7—13.
- *Asylbekov N.S.* Diagnostic problem solution in discrete devices on the basis of neuron network analysis // Nauka i novye technologii. 2005. No 1. P. 45—49.
- *Asylbekov N.S.* Methods of searching reduction for multiple malfunction localization / / Nauka i novye technologii. 2005. No 2. P. 44—48.
- *Bogatyrev Y.A., Baikov A.A.* Informational-measuring complexes for remote monitoring // Radiotekhnicheskie tetrad. 2005. No 32. P. 37—41.
- *Bogatyrev Y.A., Larin V.Yu., Liakin A.E.* Encyclopedia of electronic components. V. 1. Large integrated circuits / under edition of A.N. Erkin: MicroTeam Publisher, 2006. P. 1—246.

- *Votoropin C.D., Smolskiy S.M., Ostapenkov P.S.* Practical parameter measurement peculiarities of promising FM short-range radar of millimeter range // *Izvestia vuzov. Fizika.* 2006. V. 49. No 9. P. 99 —104.
- *Zotov V.Yu.* PicoBlaze microprocessor kernel peculiarities intended for application in projects implemented on the basis of FPGA Spartan-3, Virtex-II, Virtex-IIPRO, and Virtex-4 families // *Komponenty i tekhnologii.* 2005. No 5. P. 180—184.
- *Zotov V.Yu.* PicoBlaze microprocessor kernel peculiarities intended for application in projects implemented on the basis of FPGA Spartan-3, Virtex-II, Virtex-IIPRO, and Virtex-4 families // *Komponenty i tekhnologii.* 2005. No 6. P. C. 106—111.
- *Zotov V.Yu.* Spartan-3L — new family of highly productive efficient FPGA of Xilinx company // *Skhemotekhnika.* 2005. No 8. P. 8—9.
- *Zotov V.Yu.* Spartan-3L — new family of highly productive efficient FPGA of Xilinx company // *Skhemotekhnika.* 2005. No 9. P. 14—15.
- *Kandyrin Yu.V.* Comparative analysis of technical objects with purpose of optimal queuing for repair // *Nadiozhnost.* 2005. No 2 (13). P. 34—45.
- *Kandyrin Yu.V., Khvatynets S.A.* Devices for processor cooling and its choice automation // *Nadiozhnost.* 2006. No 2 (17). P. 60—72.
- *Kandyrin Yu.V., Khvatynets S.A.* Choice of processor cooling devices in electronic equipment // *Sistemotekhnika. Sistemnye problemy nadiozhnosti, kachestva i informatsionnykh tekhnologii.*: MIEM Publisher, 2006. No 4.
- *Kandyrin Yu.V., Koshelev A.M.* Variant ordering problem solutions using the quotient-set presented by associative models // *Ibid.*
- *Kandyrin Yu.V., Koshelev A.M.* Algorithms for object priority formation by the technical indexes with the purpose of optimal repair queuing // *Vestnik komp'uterkykh i informatsionnykh tekhnologii.* 2006. No 7. C. 18—25.
- *Kandyrin Yu.V., Moskovskiy A.E., Shkurina G.L.* Approach for repair queuing formation by the object technical characteristics // *Izvestia Volgogradskogo Tekhnicheskogo Universiteta.* 2006. No 8. P. 29—38.
- *Kandyrin Yu.V., Khvatynets S.A.* Automated multi-criteria choice of processor cooling system // *Ibid.* P. 38—47.
- *Microwave* Sensor of Small Moving for the Active Control of Vibrations and Chaotic Oscillations Modes / V.A. Fedorov, S.M. Smolskiy, A.V. Mizirin et. al. // 7th Intern. Conf. on Vibrations ICOVP-2005. ISIC University, Istambul, Turkey, 2005. P. 193—202.
- *Fundamentals* of spectral analysis / transl. From English by S.M. Smolskiy: Goriachaya liniya Telekom Publisher, 2006. P. 1—223.
- *Prozorov D.E., Petrov E.P., Smolskiy S.M., Chaschin A.A.* Pseudonoise signal synchronization based on the many-valued recurring sequences // *MPEI Vestnik,* 2005. No 5. P. 74—78.
- *Smolskiy S.M., Filippov L.I.* Three steps to profession: science, dissertation, pedagogics. Odessa: Neptun Technology Publisher, 2005. P. 1—128.
- *Smolskiy S.M., Ostapenkov P.S.* Generation solution choice for autodyne FM radar // *Izvestia vuzov. Fizika.* 2006. V. 49. No 9. P. 92—98.
- *Smolskiy S.M., Ostapenkov P.S.* High Precision FMCW Short-Range Radar with Digital Signal Processing // *Proc. of St. Petersburg IEEE Chapters.* 2005. P. 46—51.
- *Smolskiy S.M., Ostapenkov P.S.* Digital Signal Processing in High-Precision FM Radar Measuring Instrument of Extra-Small Displacement // *Intern. Radar Symp.* 2005. German Institute of Navigation (DGON). Berlin. Germany. P. 375—380.
- *Fedorov V.A., Smolskiy S.M., Lobastov A.G.* Radar-tracking Measuring Complex of a Millimeter Range for Medical Researches // *Ibid.* P. 381—386.

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- *Petrov V.V.* Teletraffic structure and algorithm for quality of service providing at self-similarity phenomenon influence: Cand. Sci. (Techn.) Dissertation. 2005.
- *Ermakov A.V.* Homogeneous active RC-filters with low parametric sensitivity: Cand. Sci. (Techn.) Dissertation. 2006.
- *Ostapenkov P.S.* Radiosignals with combined frequency-amplitude modulation for high-speed radio engineering devices: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Federal state unitary enterprise «Opytnoe konstruktorskoe buro of MPEI», Moscow
- Federal state unitary enterprise «Rossiski nauchno-issledovatel'skiy institute kosmicheskogo priporostroenia», Moscow
- R&D Institute of Semiconductor Devices (NIIPP), Tomsk
- R&B Institute of computer Complexes named after Kartsev, Moscow
- R&D Association «Altair», Moscow
- Special Scientific-Industrial Association «Eleron», Moscow
- Federal network company of RAO EES, Moscow
- Russian Academy of Reliability, Moscow
- Bauman Moscow State Technical University, Moscow
- Volgograd State Technical University, Volgograd
- Non-state Educational Enterprise TAKIR, Moscow
- R&D Center URION, Moscow
- R&D company ZASHITA, Moscow
- R&D company TechKom, Moscow
- M-Video Service company, Moscow
- MicroTeam company, Moscow
- Academic-Research center «High-radio-technologies in medical electronics» created by RR department in Medical Instruments Institute of Yonsei University, Seoul, Republic of Korea
- Electronics Department of Korean Polytechnic University, Seoul, Republic of Korea
- SINUS-TEC Co. Ltd, Seoul, Republic of Korea
- Medical faculty of National Polytechnic Institute. Mexico

■ Unique equipment

- Portable measuring radar complex for remote diagnostics of person functional condition
- Complex for technological processes automation of metal extraction from the solutions and of deep cleaning of galvanic wastes
- System for collection, processing and remote transmission of technological information from the power engineering objects at increased radio interference level
- High-precision radar level-meter in millimeter wave-range

At RS department:
10 teachers,
9 Ph.D. students.

Head of department
Ph.D. (Techn.)
Senior researcher Yuri A. EVSIKOV

■ Main Lines of Research

Research Supervisor

- **Development of complex amplitude method for statistical analysis and modeling of radio engineering devices and systems**
Senior researcher Evsikov Yu.A.
- **Theory and statistical synthesis methods of radio engineering devices and systems at full and non-full a priori information**
Professor Pervachov S.V.
- **System analysis of complex technical systems**
Professor Gubonin N.S.
- **Modeling methods development for signal distortions in non-linear units of on-board receiver-transmitter devices of satellite communication**
Associated-Professor Borisov V.A.

■ Agreements, contracts, projects supported by the state budget

- Investigation, analysis, classification and choice of modes and multi-station access products for satellite multi-protocol transport network of fixed service
- Development of typical program and certification test technique of multi-station access satellite equipment
- Modeling methods development for signal distortion in non-linear units of on-board receiver-transmitter devices for satellite communication and navigation
- Short-range radar of millimeter range
- Measurement ambiguity detection of high-precision altimeter of signal source using new principle of signal processing
- Development of new algorithms and software for non-distorted compression and for compression with limited losses of multi-component images

■ Key publications

- *Pervachov S.V., Fam Khai Chung.* Adaptation of digital radio engineering tracking systems to the dynamic affect of unknown intensity // MPEI Vestnik. 2005. No 4. P. 91—96.
- *Fam Khai Chung.* Adaptive digital radio engineering tracking system with second-order filter // 2005. No 31. P. 59—64.
- *Fam Khai Chung.* Adaptive digital radio engineering tracking system with \cdot -filter // Radiotekhnicheskie tetradi. 2005. No 31. P. 64—69.
- *Babkin V.F., Vasileiskiy A.S., Knizhny I.M., Khrekin K.E.* Methods of video information compression on space vehicle board obtained by multi-zone registrating devices // Proc. of III All-Russia conf. «Modern problems of Earth remote sounding from the space»: IKI RAS Publisher, 2005. P. 59—60.

- *Khrekin K.E.* Correlation approach application combined with the motion compensation methods at image sequence compression without the losses // Ibid. P. 100–101.
- *Knizhny I.M.* Modification of truncated unit-type coding method for its application at image compression in the remote Earth sounding tasks // Ibid. P. 101–102.
- *Boldenkov E.N.* Statistical analysis of combined signal phase tracking system in receivers of satellite navigation // Proc. of XI Intern. conf. «Radar, navigation, communication». Vol.3. Russia. Voronezh, «Sakvoee Publisher», 2005. P. 1366–1376.
- *Shatilov A.Yu., Perov A.I.* Instability effect in inertial-satellite navigational system with double-level interconnecting and non-coherent receiver // Ibid. P. 1376–1384.
- *Shatilov A.Yu., Perov A.I.* Inertial-satellite navigational system criticality with non-coherent receiver to accuracy of orientation angles determination // Proc. of All-Russia conf. of young researchers «Modern problems of radio electronics», dedicated to 110-th anniversary of Radio Day. Russia, Krasnoyarsk: KSTU Publisher. 2005. P. 61–63.
- *Boldenkov E.Y., Perov A.I.* Optimization of signal parameters estimation algorithms for on-board equipment of intersatellite measurements under condition of restricted observation time // Ibid. P. 64–66.
- *Boldenkov E.Y., Perov A.I.* Tracking algorithm synthesis for signal parameters in on-board equipment of intersatellite measurements // Radiotekhnika. 2005. No 7. P. 101–111.
- *Shatilov A.Yu., Perov A.I.* Optimal algorithm synthesis and analysis for complexation of non-coherent receiver and on-board navigation inertial system // Radiotekhnika. 2005. No 7. P. 94–100.
- *Zhelbakov I.N., Zamolodchikov V.N., Smolskiy S.M., Tarasov A.E.* Experience of Consortium «Moscow universities in Mongolia» organization // Proc. of conf. «International co-operation of Russian universities at present-day, 25–26 of Jan. 2005. Russia, Moscow, MGTU Publisher.
- *Boldenkov E.Y., Perov A.I.* Investigation of complex interpolation algorithm in satellite measurement system // Proc. of All-Russia conf. of young researchers «Modern problems of radio electronics». Russia, Krasnoyarsk: KSTU Publisher. V.1, 2006. P. 512–515.
- *Proc. of All-Russia conf. of young researchers «Modern problems of radio electronics», dedicated to 110-th anniversary of Radio Day. Russia, Krasnoyarsk: KSTU Publisher. 2005. P. 61–63.*
- *Shatilov A.Yu.* informational congestion in scientific-technical sphere // Ibid. P. 584–587.
- *Weighting* functions application for pseudo-noise signal preliminary processing at the presence of strong interference noise / R.V. Bakit'ko, V.P. Pol'schikov, A.I. Shilov etc. // Radiotekhnika. 2006. No 6. P. 13–17.
- *Boldenkov E.Y., Perov A.I.* Interpolation algorithm investigation of complex optimal estimates in intersatellite measurement systems // Radiotekhnika. 2006. No 7. P. 84–88.
- *Perov A.I., Shatilov A.Yu.* Synthesis and analysis of single-step signal processing algorithm in coherent receiver // Radiotekhnika. 2006. No 7. P. 75–79.
- *Babkin V.F., Vasileiskiy A.S., Knizhny I.M., Khrekin K.E.* Self-descriptiveness coordination of space collecting systems of remote Earth sounding with radio channel carrying capacity by means of video information compression // Proc. of seminar «Devices for space investigations of planets and Earth»: IKI RAS Publisher, 2006. P. 27–28.

■ Patents

- *Patent 2250074 RF.* Oxyrespirator / A.S. Pil'schikova. 2005.
- *Patent 2255325 RF.* Gas concentration meter / A.V. Telichev. 2005.
- *Patent 2258456 RF.* Device for electrocardiogram obtaining / E.V. Lisovskiy. 2005.
- *Patent 2259161 RF.* Pulse oxymeter / D.S. Vinokurov // BI. 27.08.05.
- *Patent 2264785 RF.* Device for heart rhythmogram formation / A.Yu. Sipavin. 2005.
- *Patent 2266041 RF.* Carrying device for ECG monitoring / P.Yu. Volobuev. 2005.
- *Patent 46118 RF.* Device for air-ion diagnostic, reflexotherapy and identification / B.S, Mel'nokov etc. 2005.
- *Positive* decision on patent issue on the application No 2004100290 on invention: Differential vector-cardiograph / S.V. Sasim // Decision dated 05.09.2005.

■ Partners

- Federal State Unitary Enterprise «Osoboe konstruktorskoe buro MPEI, Moscow
- «Morskoj R&D Institute of radio electronics «Al'tair», Moscow
- Federal State Unitary Enterprise «Rossiyskiy R&D Institute of space instrumentation», Moscow
- PAO «EES Rossii», Moscow

■ Unique equipment

- Equipment for transmission of relay protection commands NSD550, NSD70D, NSD570
- Equipment for transmission of relay protection commands and anti-damage automation AES550
- Equipment of RF communication ETL500 and SDH/PDH; telecommunication platform FOX515

At ARWP department:
13 teachers,
3 researchers,
5 Ph.D. students.

Head of department Doctor of technical sciences,
Professor Sergey E. BANKOV

■ Main Lines of Research

Research Supervisor

- **Analysis of propagation processes and complex structure wave diffraction on the basis of hybrid numerical asymptotic methods**
Associated-Professor Solodukhov V.V.
- **New antennas construction principles for application in modern radio engineering systems and devices of various purposes**
Professor Sazonov D.M., Associated-Professor Bodrov V.V.
- **Analysis of propagation processes and wave diffraction in heterogeneous and non-linear medium**
Professor Permyakov V.A.
- **Mathematical modeling of pulse signal emission and propagation**
Professor Permyakov V.A.
- **Designing principles of modern microwave and millimeter range antennas**
Professor Bankov S.E.
- **Modern hybrid integrated circuits of millimeter range**
Professor Bankov S.E.
- **Mathematical modeling of photon crystals with defects**
Professor Bankov S.E.

■ Agreements, contracts, projects supported by the state budget

- Development of mathematical modeling methods for promising antennas and for electromagnetic wave propagation and diffraction in real conditions
- Fundamental investigations of emission and propagation of ultra-wide-band and ultra-short pulse signals in real medium with application to radar technologies

■ Key publications

- *Bankov S.E.* Bare waves of waveguide in two-dimensional photon crystal from the metal cylinders // Radiotekhnika i elektronika. 2006. V. 51. No 5. P. 533—542.
- *Bankov S.E.* Slot integrated circuits // Radiotekhnika i elektronika. 2006. V. 51. No 9.
- *Baskakov A.I., Min Ho Ka, Permyakov V.A.* Ionosphere influence on radio wave polarization and on output response form of synthesized aperture radar distance channel at point target // Radiotekhnicheskie tetradi. 2005. No 31. P. 30—34.
- *Baskakov A.I., Min Ho Ka, Permyakov V.A.* Disperse distortion analysis of space synthesized aperture radar wide-band signal for sub-surface sounding in decimeter range in the ionosphere // Radiotekhnicheskie tetradi. 2005. No 31. P. 34—36.
- *Permyakov V.A., Vladimirov L.M.* About energy relations at flat electromagnetic wave passing through the flat boundary of absorbing medium // Radiotekhnicheskie tetradi. 2005. No 31. P. 41—45.

- *Accuracy* characteristic analysis of space synthesized aperture radar interferometer with the variable base formed on single-position SAR at space apparatuses being on the synchronously related orbits / A.I. Baskakov, V.I. Gusevskiy, Zherdev P.A. etc. // Elektrotekhnicheskie i informatsionnye komplekxy i sistemy. 2006. N 1. V. 2. P. 46–49.
- *Balagurovskiy V.A., Davydov V.A., Kondrat'ev A.C., Polischuk N.P.* Adaptive control of phased antenna array for interferences suppression // Proc. of conf «System problems of navy informational-controlling complexes (effectiveness, reliability, economic: «AGAT» Publisher, 2005. part 2. P. 82–89.
- *Zelkin E.G., Kravchenko V.F., Gusevskiy V.I.* Constructive approximation methods in antennas theory: Science Press Publisher, 2005. 512 p.

■ **Patents**

- *Patent 2263930 RF.* Laser radar station / V.I. Gusevskiy, A.V. Suetenko. Registered at 10.11.2005

■ **Dissertations**

- *Sabirov M.M.* Design algorithm development for wire antennas located in foliated medium with losses: Cand. Sci. (Techn.) Dissertation. 2006.

■ **Partners**

- Institute of Radio Engineering and Electronic RAS, Moscow
- Institute of theoretical and applied electrodynamics RAS, Moscow
- Federal State Unitary Enterprise «Osoboe konstruktorskoe buro MPEI, Moscow
- Institute of Electrical and Electronic Engineers (IEEE), USA

At RD department:
14 teachers,
6 Ph.D. students

Head of department Doctor of technical sciences,
Professor Alexander I. BASKAKOV

■ **Main Lines of Research**

Research Supervisor

- **Methods and algorithms of three-dimensional surface relief reconstruction with the help of combining of the interferometer radar with synthesized antenna aperture and the precision radio altimeter**
Professor Baskakov A.I.
- **Investigation and development of radar systems for Earth and planets remote sensing**
Professor Baskakov A.I., Associated-Professor Lukashenko Yu.I.
- **Ahigh-effective methods analysis and development for digital spatial-time processing of radar information**
Associated-Professor Lukashenko Yu.I.
- **Radar systems investigation and development operating in complicated interference environment**
Associated-Professor Zhutyaeva T.S.
- **Development of modern radar complexes for earthquake prediction and sub-surface anomalies detection**
Associated-Professor Zhutyaeva T.S.
- **Theory and technique for optimal digital generation and processing of arbitrary radio signal forms**
Associated-Professor Matiushin O.T.
- **Theory of signals with continuous angle modulation for system of digital message transmission via the communication channels at restricted bandwidth**
Associated-Professor Matiushin O.T.
- **Logic algebra, information and coding theory**
Professor Naryshkin A.K.
- **Development of specific TV technical vision systems and devices using microprocessor technique**
Associated-Professor Bugaev Y.N.
- **Hardware-software methods of video information compression and methods of visual information urgent processing with the help of signal processor**
Associated-Professor Bugaev Y.N.
- **Development of multi-channel TV tracking systems**
Associated-Professor Bugaev Y.N.

■ **Agreements, contracts, projects supported by the state budget**

- Fundamental investigation of radar remote sensing methods for determination Earth and Ocean surface characteristics from the flying and space apparatuses
- Processing algorithm investigation and development of noise-immune digital system for radio FM signal search and demodulation
- Investigation and development of digital system for radio pulse-modulated signal search and demodulation

- Analysis of quality characteristics of interferometers fulfilled on the basis of synthesized aperture radar
- Analysis of application possibilities of electrically frequency controlled oscillators in radar systems

■ Key publications

- *Baskakov A.I., Dronov D.V., Min-Ho Ka.* Calculation technique for permissible FM oscillator non-linearity of geo-radar // *Elektrotekhnicheskie i informatsionnye kompleksy i sistemy.* 2006. No 3. V.1, P. 32–36.
- *Accuracy* characteristics analysis for the synthesized aperture radar – interferometers with variable base which is formed from single-positioned SAR on the space apparatuses flying in synchronously related orbits / A.I. Baskakov, V.A. Terekhov, V.A. Permyakov etc. // *Ibid.* No 1. V. 2. P. 46–49.
- *Naryshkin A.K.* Digital devices and microprocessors: Academia Publisher. 2006. 320 p.
- *Matiushin O.T., Naryshkin A.K.* Synthesis and investigations of digital devices: MPEI Publishing House, 2005. 28 p.
- *Sizov V.P.* Fast-acting TV analyzers: MPEI Publishing House, 2005. 50 p.
- *Sizov V.P.* Text coding by Haffmen method for first and second order model for message source // *Radiotekhnicheskie tetradi.* 2005. No 31. P. 71–74.
- *Baskakov A.I., Min Ho Ka, Permyakov V.A.* Ionosphere influence on radio wave polarization and on output response form of synthesized aperture radar distance channel at point target // *Radiotekhnicheskie tetradi.* 2005. No 31. P. 30–34.
- *Baskakov A.I., Min Ho Ka, Permyakov V.A.* Disperse distortion analysis of space synthesized aperture radar wide-band signal for sub-surface sounding in decimeter range in the ionosphere // *Radiotekhnicheskie tetradi.* 2005. No 31. P. 34–36.
- *Distortion* analysis for wide-band linear FV signals in ionosphere with account of dispersion and ionosphere sphericity / A.I. Baskakov, V.A. Permyakov, Isakov M.V. etc. // *Radiotekhnicheskie tetradi.* 2005. No 31. P. 37–40.
- *Grishechkin B.Yu.* Reflected signal modeling of satellite high-precision oceanographic radio altimeter // *Voprosy radioelektroniki. Series OT. No. 1.: TSNII Elektronika Publisher.* 2005. P. 10.
- *Grishechkin B.Yu.* Phenomenological modeling of distance measuring signal of satellite oceanographic linear FM radio altimeter // *Proc. of conf. «Future of Russian cosmonautics».* Koroliov: IPK Mashpribor Publisher, 2005. P. 6.
- *Grishechkin B.Yu.* Reflected signal modeling of satellite high-precision oceanographic radio altimeter // *Proc of III Intern. conf. «Electronic means and control systems: Tomsk: Atmosphere optics Institute Publisher,* 2005. P. 4.
- *Zhutiaeva T.S., Baskakov A.I., Terekhov V.A.* Double-frequency radio interferometer for area of water surface condition estimation from small space apparatus // *Proc. of XXIII All-Russia symp. «Radar investigation of nature environments»:* Sankt-Peterburg, 2005. P. 105–112.
- *Baskakov A.I., Vazhenin N.A., Ka Min-Ho.* Energy characteristics analysis in Doppler radar // *Proc. of Intern. conf. on computer intellect, China,* 2005. P. 125–129.
- *Distortions* of ultra-wide-band linear FM signals in ionosphere with account of dispersion and refraction effects / A.I. Baskakov, V.A. Permyakov V.A., Isakov M.A. etc. // *Proc. of IV Intern. conf. «Physics and technical applications of wave processes».* (Appendix to journal «Physics of wave processes and radio engineering systems») / under edition of V.A. Nagaev and G.P. Yarovoy. N. Novgorod, 2005. P. 193–194.

- *Baskakov A.I., Vazhenin N.A., Volkovskiy A.C., Ka Min-Ho.* Analysis of ground heterogeneity influence on the maximal deep of sub-surface sensing // Proc. of 1st Intern. conf. «Ultra-wide-band signals and ultra-short pulses in radar technologies, communication and acoustics»: 2005. P. 95—98.
- *Baskakov A.I., Vazhenin N.A., Ka Min-Ho, Prozorov D.E.* UWB radar for sub-surface sensing with pulse linear FM // Ibid. P. 167.
- *Petrakov E.I.* Accuracy characteristics of target angle position discriminators under the influence of receiving channel inherent noise in digital antenna array // Proc. of Intern. conf. «Digital methods and technologies» DMT—2005. V. 1. Taganrog: «Anton Publisher, 2005. P. 33—39.
- *Baskakov A.I., Ka Min-Ho, Terekhov V.A.* Sea wave ordinates estimation by mutual double-frequency correlation function of reflected signals at nadir antenna aperture synthesis // Radiotekhnika. 2006. No 12. P. 37—41.
- *Baskakov A.I., Ka Min-Ho.* Selection of Pulse Repetition Frequency In High Precision Oceanographic Radar Altimeters // IEEE Geoscience and Remote Sensing Letters. 2006. No 9. P. 345-348.
- *Bugaev J., Bryuhoveckij, A. Suetenko.* Lidar complex for remote parameter measurement of soiling an organic originand their identifications (Sherna-lidar). № 6251 (Proc. SPIE).
- *Bugaev J., Bryuhoveckij, A. Suetenko, Bugaev E.* Results of tests on measurement of flight vehicles co-ordinates by using laser-television measuring stations. № 6251 (proc. SPIE).
- *Балковой А.П., Бугаев Ю.Н., Суетенко А.В., Цаценкин В.К.* Цифровой следящий электропривод высокоточных лазерных станций координатных измерений. Электричество, № 5, 2004. С. 34—37.

■ **Dissertation**

- *Advi Hekmet Samir.* Peculiarities of text compression in Arabian: Cand. Sci. (Techn.) Dissertation. 2005.

■ **Partners**

- Federal State Unitary Enterprise «Special Research Bureau of MPEI», Moscow
- Federal State Unitary Enterprise «Rossiyskiy R&D Institute of space instrumentation», Moscow
- R&D Institute of precision instrumentation, Moscow
- Institute of space investigations RAS, Moscow
- Institute of oceanology RAS, Moscow
- Korean Polytechnic University, Seoul, Republic of Korea

■ **Unique equipment**

- Educational workshop on theoretical bases of radar and navigation technologies

At GRE division:
11 researchers

Head of GRE
Ph.D. Senior researcher
Alexander A. KITAITSEV

■ Main Lines of Research

Research Supervisor

- **Fundamental problems of gyromagnetics**
Professor Mikhailovskiy L.K.
- **Local measurement of magnetic parameters of various form small products**
Radchenko V.F.
- **Physical-technical properties investigation for composite materials on the basis of high-anisotropic ferrites and creation of microwave and millimeter range devices**
Senior researcher Kitaitsev A.A.
- **Development and investigation of millimeter range devices on the basis of high-anisotropic gyromagnetic materials**
Associated-Professor Pollak B.P., senior researcher Khanamirov A.E.
- **Frequency-selective method and equipment creation for signal energy parameters measurement in microwave and millimeter wave-lengths**
Senior researcher Kitaitsev A.A.
- **Radio wave methods and equipment for technological process testing and controlling**
Senior researcher Khanamirov A.E., Puchkov I.S.
- **Investigation and development of methods and equipment for lengthy object measurements (cables, ropes etc.)**
Puchkov I.S., Puchkov V.S.

■ Agreements, contracts, projects supported by the state budget

- Fundamental investigation of UHF properties of alloyed ferrites
- Ferrite absorbers of electromagnetic wave energy in UHF range
- Development of new frequency-selective gyromagnetic absorbers of electromagnetic emission for unwanted oscillation suppression in radio electronic equipment
- Development of flat gyromagnetic layers for electromagnetic wave energy absorption
- Local hysteresis investigation method for ferromagnetic structures of small forms
- Physical-chemical processes investigation for high-Q heterogeneous ceramic materials formation

■ Key publications

- *Koledintseva M.Y., Kitaitsev A.A.* Modulation of Millimeter Waves by Acoustically Controlled Heagonal Ferrite Resonator // IEEE Transaction on Magnetics. 2006. Vol. 41. No 8. P. 2368—2376.
- *Study of* Electromagnetic Wave Energy Absorption in Composite Media Based on «Ferrite-Graphite» Mixture / S.V. Serebryannikov, A.A. Kitaitsev, V.P. Cheparin, L.L. Eremtsova // ICFM—2005, Abstracts, Ukraina, Crimea, Partenit, 2005. P. 221.

- *Composite* Magnetic Coverings Absorbing Electromagnetic Waves in Radio Electronic Systems / N.V. Stepanov, V.P. Cheparin, S.V. Serebryannikov, L.L. Eremtsova // Ibid. P. 220.
- *Kitaitsev A.A., Shinkov A.A., Zhumbaeva G.N.* Electrodynamic parameters of composite medium on the basis of schungite and cobalt particles mixture // Proc. of XVI Intern. Conf. on Spin-Electronics and Gyrovector Electrodynamics, Moscow. Firsanovka. 2005—2006. P. 315—318.
- *Petrova I.I., Khanamirov A.E.* To the question of millimeter wavelength measurements of hexa-ferrite resonant parameters in conformity with industrial manufacture // Ibid. P. 319—327.
- *Kitaitsev A.A., Radchenko B.F.* Modulation investigation method for magnetization processes of small size ferromagnetic articles in local areas // Ibid. P. 328—333.
- *Zhumbaeva G.N., Kitaitsev A.A.* Dielectric parameters of composite medium on schungite basis // Intern. conf. of students «Radio Electronics, Electrical Engineering, Energetic. In 3 vol. MPEI Publishing House, 2006. V. 1. P. 559.
- *Kitaitsev A.A.* Frequency converter at partial saturation of gyromagnetic resonator // Proc. of Intern. conf. «Statistical methods in natural, technical and humanitarian sciences» SM—2006. Taganrog, TSREU Publisher, 2006. V. 4. P. 35—37.
- *Possibility* of absorption increasing for composite medium on the basis of alloyed ferrite powders / A.A. Kitaitsev, V.P. Cheparin, F.N. Shakirzyanov, A.A. Shinkov // Proc. of XI Intern. Conf. «Electromechanics, electrical technologies, electrical materials and components», Crimea, Alushta. 2006. V. 1. P. 131—132.
- *Equipment* support for modulation investigation method for magnetization curve of small ferromagnetic articles / A.A. Kitaitsev, D.V. Lebedev, I.C. Puchkov, V.F. Radchenko // Ibid. P. 133—134.
- *Kitaitsev A.A., Zhumbaeva G.N.* Development of frequency method for permittivity measurement of composite medium on the basis of ferrite // Ibid. P. 135—136.
- *Engineering* of Ferrite-Graphite Composite Media for Microwave Shields / M. Koledintseva, P.C. Ravva, J. Drewniak et. al. // Electromagnetic Compatibility, 2006. IEEE Intern. Symp. Vol. 3. 2006. P. 598—602.

■ Partners

- RIA «ISTOK», Moscow
- R&D Institute «Domen», Sankt-Peterburg
- Concern «Phasotron», Moscow
- All-Russia R&D Institute of cable industry, Moscow
- All-Russia Institute of aviation materials, Moscow
- Plant «Moskabelmet», Moscow
- Institute of Radio Engineering and Electronics RAS, Moscow
- Mikoyan Moscow mechanical plant
- Institute of Radio Engineering and Electronics, Khar'kov, Ukraine
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin, Moscow
- Plant «Magnetron», Sankt-Peterburg

■ **Unique equipment**

- Frequency-selective panoramic meter for power density of wide-band noise signals
- High-precision meter of lengthy articles
- Harmonic filters for powerful UHF emission sources
- Ferrite resonant decouplers of millimeter range
- Hexa-ferrite band-pass filters of millimeter range

Ph.: (495) 362-7695,
fax: (495) 362-8938,
E-mail: retfec@mpei.ru

At MRETT center:

1 chief-researcher, Dr.Sci., Professor,
1 senior researcher, Ph.D.,
1 engineer,
2 Ph.D. students.

Supervisor
Doctor of technical sciences,
Professor Alexander I. PEROV

■ **Main Lines of Research**

- **Statistical synthesis of radio engineering systems and devices**
- **Adaptive radio systems**
- **Modern tracking systems in radar and radio navigation technologies**
Satellite radio navigation systems GLONASS, GPS
- **Neuron network methods and algorithms if radio engineering**
- **Radio electronic warfare**
- **Modern fast-acting communicational systems**

■ **Agreements, contracts, projects supported by the state budget**

- Studying the influence of structure and signal packet parameters on detection probability and pseudo-distance measurement accuracy for pre-production model BSIM
- Technical solution complex development on on-board application of high-precision controlled artillery ammunition of the satellite radio navigation system equipment
- Investigation and modeling of signal processing algorithms for BSIM equipment
- Search investigations and new method development for synthesis of heterogeneous data joining algorithms from the geographically distributed heterogeneous information sources
- Search investigations of optimal algorithms of high-precision and noise immune object movement parameters determination in combined INS/GLONASS navigation systems
- Search investigations of methods and algorithms for navigation receiver optimal structure of GLONASS navigation system of 4th generation on the basis of the single-stage signal processing
- Search investigations and development of neuron network algorithms for recognition, identification and tracking of complex grouped and maneuvering targets
- Investigation on creation of noise immune integrated navigation complexes on the basis of adaptive spatial-time signal processing
- Investigation on creation of device for parameter determination of object spatial orientation by GNSS signals
- Development of estimation technique for errors influence of BSIM delay measurement on accuracy of frequency-time correction formation
- Execution of fundamental research on estimation of system FSPD signals interference influence on the navigational equipment functioning for space navigation systems GLONASS and GPS consumers

- Investigations of perfection ways and creation of new generation facilities and systems for radio electronic warfare for promising satellite radio navigation systems consumers

■ Key publications

- *GLONASS*. Structure and functioning principles // Under edition of A.I. Perov, V.N. Kharisov: Radiotekhnika Publisher, 2005. 688 p.
- *Distance* and velocity estimation in radar systems / V.I. Merkulov, A.I. Perov etc. *Radio i sviaz*, 2004. V. 1. 312 p.
- *Perov A.I., Shatilov A.Yu.* Synthesis and analysis of single-stage algorithm for signal processing in navigation system coherent receiver // *Radiotekhnika*. 2006. No 7. P. 75—79.
- *Perov A.I., Boldenkov E.N.* Complex algorithms investigation for optimal estimate approximation in system of inter-satellite measurement // *Radiotekhnika*. 2006. No 7. P. 84—88.
- *Perov A.I., Boldenkov E.N.* Adaptive transversal filter investigations for satellite navigation receivers at narrow-band interference influence // *Radiotekhnika*. 2006. No 7. P. 98—105.
- *Perov A.I., Shatilov A.Yu.* Combined algorithm synthesis for complexation on primary and secondary levels in inertial satellite navigation system // *Radiotekhnika*. 2005. No 7. P. 4—14.
- *Perov A.I., Boldenkov E.N.* Algorithm synthesis for signal parameter tracking in on-board equipment of inter-satellite measurements // *Radiotekhnika*. 2005. No 7. P. 15—20.
- *Perov A.I.* Optimal algorithm synthesis for signal processing in satellite navigation receiver at harmonic interference influence // *Radiotekhnika*. 2005. No 7. P. 36—42.

■ Partners

- Section of Applied Problems, RAS, Moscow
- Air Force Engineering Academy named after Zhukovskiy, Moscow
- Bauman Moscow State Technical University, Moscow
- Federal state unitary enterprise «Opytnoe konstruktorskoe buro of MPEI», Moscow
- Central Institute of Radio Electronic Systems, Moscow
- «Radar MMS» company, Sankt-Peterburg
- «Phasotron NIIR Corporation, Moscow
- Federal State Unitary Enterprise «Rossiyskiy R&D Institute of space instrumentation», Moscow
- Design Bureau «Navigation Systems», Moscow

■ Unique equipment

- Programmed receiver of satellite navigation GPS system
- Equipment for interference signal formation for consumer equipment of satellite navigation GPS system

At FP department:
53 teachers,
7 researchers,
8 Ph.D. students.

Head of department Ph.D. Associated-Professor,
Olga A. EVTIKHIEVA

■ Main Lines of Research

Research Supervisor

□ **Laser gradient refractography**

Associated-Professor Evtikhieva O.A.

□ **Applied laser optics**

Professor Ischenko Ye.F.

□ **Laser diagnostics of microflows: application in energetic and thermo-physics**

Professor Rinkevichyus B.S.

□ **Statistical optics and laser diagnostics of turbulence**

Professor Smirnov V.I.

□ **Investigation of inelastic electron collisions with atoms and molecules**

Professor Smirnov Yu.M.

□ **Investigation of semiconductor laser characteristics**

Associated-Professor Koval' O.I.

□ **Computer image processing for optical methods of flow diagnostic**

Ph.D. Skornyakova N.M.

□ **Optical systems with polarization heterogeneity**

Associate-Professor Sokolov A.L.

■ Agreements, contracts, projects supported by the state budget

- Development of background oriented schlieren method for investigation of heat-exchange processes in liquid and gas
- Investigation and development of computer algorithms for measuring information analysis in laser systems for liquid, gas and plasma flows diagnostic
- Computer modeling of laser measuring systems
- Development of theoretical bases of refraction methods for liquid and gas flows diagnostics with computer optical visualization images processing obtained in laboratory and nature experiments
- Computer signal and image processing in laser measuring systems

■ Key publications

- *Evtikhieva O.A., Raskovskaya I.L.* Laser Beam Refraction in Acoustic Field // Proc. of SPIE «Optical Methods of Flow Investigation» / Ed. Y.U. Dubnistchev, B.S. Rinkevichyus. M.: SPIE. 2006. Paper 626209.
- *Rinkevichyus B.S., Raskovskaya I.L., Tolkachev A.V.* Diffraction-Shadow Technique of Single Bubble Size and Velocity Measurements // Ibid. Paper 62620H.
- *Jelinkova H., Sulc J., Basiev T.T., Zverev P.G., Kravtsov S.V.* Stimulated Raman Scattering in Nd:SrWO₄ // Laser Physics Letters. 2. 2005. P. 4–11.

- *Pico-seconds* pulses amplification in LiF:F2 crystals at synchronous pico- and nano-second laser pumping / T.T. Basiev, A.Ya. Karasik, V.A. Koniushkin etc. // *Kvantovaya elektronika*. 2005. No 35 (4). P. 344–346.
- *Biriukova O.V., Smirnov Yu.M.* Turbulence statistical characteristics measurement by optical system with hybrid fiber-optic sensor // *Izmeritelnaya tekhnika*. 2006. No 9. P. 27–31.
- *Blizniuk V.V., Gvozdev S.M.* Quantum emission sources: VIGMA Publisher, 2006. 400 p.
- *Evtikhieva O.A.* Laser sheet refraction in spherically heterogeneous heat boundary layer // *Izmeritelnaya tekhnika*. 2006. No 5. P. 35–38.
- *Evtikhieva O.A.* Laser sheet refraction modeling in transparent radial-heterogeneous medium // *Izmeritelnaya tekhnika*. 2006. No 10. P. 49–52.
- *Evtikhieva O.A., Moskalevich V.I., Skorniyakova N.M.* Digital spectral processing analysis of laser Doppler vibrometer // *Izmeritelnaya tekhnika*. 2006. No 9. P. 42–45.
- *Raskovskaya I.L., Rinkevichyus B.S., Tolkachev A.V.* Acoustic pressure determination in liquid by the passed laser beam parameters // *Izmeritelnaya tekhnika*. 2006. No 6. P. 53–55.
- *Smirnov Yu.M.* Dissociative excitation at electron and CaBr₂ molecules collisions // *Khimicheskaya fizika*. 2006. V. 25. No 9. P. 49–54.
- *Smirnov Yu.M.* Formation of excited single-charged selenium ions at e-Se₂ collisions / *Optics and spectroscopy*. 2006. V.100. No 5. P. 728–736.
- *Smirnov Yu.M.* Excitation of scandium atom G- and H-levels at collisions with slow electrons // *Optics and spectroscopy*. 2005. V. 98. No 4. P. 553–557.
- *Smirnov Yu.M.* Excitation of PtI transitions finished at singlet levels // *Teplofizika vysokikh temperatur*. 2005. V. 43. No 4. P. 510–515.
- *Smirnov Yu.M.* Dissociative excitation sections for odd triplet levels of iron atom at e-FeCl₂ collisions // *Khimicheskaya fizika*. 2005. V.24. No2. P. 56–61.

■ Dissertations

- *Blizniuk V.V.* Planar position-sensitive measuring transducers of laser emission. Cand. Sci. (Techn.) Dissertation. 2005.
- *Imshenestkiy A.I.* Development and calculation of optical-electronic systems for liquid and gas flow diagnostics: Cand. Sci. (Techn.) Dissertation. 2005.
- *Raskovskaya I.L.* Theoretical and experimental substantiation of laser diagnostic methods for acoustic field in liquids and gases: Cand. Sci. (Phys.-Math.) Dissertation. 2005.

■ Partners

- Institute of General Physics, RAS, Moscow
- Heat-and-Mass Exchange Institute, National Academy of Sciences of Belarus, Minsk, Belarus
- Thermophysics Institute, RAS Siberian Branch, Novosibirsk
- Bauman Moscow State Technical University
- Lomonosov Moscow State University, Moscow
- Germany air-space agency, Gettingen, Germany
- Joint Institute of High Temperatures, RAS, Moscow
- Sankt-Peterburg state technical university

- Levedev Physical Institute, RAS, Moscow
- Baranov Central Institute of Aviation Motors, Moscow
- Edinborough University, UK

■ **Unique equipment**

- Fiber-optics sensors for air-hydrodynamic flow research
- Laser automated setup for turbulence diagnostics
- Laser setup for flow velocity field measurement with the particle image method
- Laser-computer refraction system for investigation of the non-stationary heat processes in liquid
- Installation for inelastic collision investigations of electrons with atoms and molecules

At ED department:

16 teachers,

10 engineers,

4 Ph.D. students.

Head of department

Ph.D. (Techn.), Associated-Professor

Vladimir N. BODROV

■ Main Lines of Research

Research Supervisor

- **Development and investigation of vacuum and solid-state UHF devices and sets**

Professor Lebedev I.V.

- **Pnew methods and devices development for ultrasonic non-destructive testing of lengthy complicated-structure materials and articles**

Professor Kachanov V.K.

- **Development of wide-band mosaic (composite) piezo-transducers for the ultrasonic noise immune monitoring tasks of composite materials and building constructions**

Professor Kachanov V.K.

- **Fluctuation phenomena in electronic devices**

Professor Vorob'iov M.D.

- **Reliability diagnostic and forecast for electronic engineering unit elements**

Professor Vorob'iov M.D.

- **Thermovision**

Associated-Professor Bodrov V.N.

- **Polychromatic pyrometry**

Associated-Professor Bodrov V.N.

- **Optical image processing**

Associated-Professor Obidin G.I.

■ Agreements, contracts, projects supported by the state budget

- Development of creation principles of new elements and systems of modern electronics
- Search investigations of technical approaches for creation of new generation for low-level TV detection and pointing equipment on the basis of Si CCD matrix with multiplying channel and of image processing means with microprocessors in real time
- Search investigations of technical approaches for development and implementation of remote temperature measurement methods of fast-moving objects
- Development of instrumental complex and technique for non-destructive acoustic monitoring and diagnostic of construction elements and equipment for nuclear power plants
- Creation and functioning support of research-academic structure on the basis of MPEI (TY)
- Development of high-sensitive and high-precision methods and devices for ultrasonic monitoring and diagnostic of construction materials and units
- Development of high-sensitive and high-precision methods and devices for ultrasonic thickness meters of composite articles of aviation engineering

- Investigation of multi-channel ultrasonic diagnostic methods of heterogeneous construction materials at one-sided access
- Development of hardware-software complex for ultrasonic monitoring of lengthy building constrictions from concrete
- Development of theory and high-precision ultrasonic monitoring of lengthy articles from the complicated-structure materials
- Development of research potential of higher educational institutions at 2006—2007.

■ Key publications

- *Electronic* devices and UHF technology / under edition of I.V. Lebedev. Vol.1. UHF generators and amplifiers: Radiotekhnika Publisher, 2005. 352 p.
- *Lebedev I.V.* Russian scientists achievements in area of UHF electronics // Radiotekhnika. 2006. No 3. P. 3—96.
- *Lebedev I.V.* UHF electronics in UESTC // University of Electronic Science and Technology Weekly. 25.09.2006. P.11 (in Chinese).
- *Vorobyev M.D., Judaev D.N.* The Electrofluctuation Investigation Methods of Materials and Structures Quality // Intern. Conf. «Functional Materials». Ukraine, Crimea, Partenit, 2005. P. 354.
- *Vorobyev M.D., Judaev D.N., Glumova M.V., Andzhelo Ya.G.* Noise model of thermoionic cathode // Proc. of XVI Intern. Crimean conf. «UHF technique and telecommunication technologies». Ukraine, Sevastopol, 2006. P. 307—308.
- *Kachanov V.K., Sokolov I.V., Zaliotkin A.V., Fiodorov M.B.* Multifunctional equipment of ultrasonic monitoring // Proc. of V Intern. conf. «Non-destructive control and technical diagnostic in industry»: Mashinostroenie Publisher, 2006. P. 33.
- *Avramenko S.L., Sokolov I.V., Kachanov V.K.* Portable ultrasonic multiplicative-resonant thickness meter on the basis of signal processor // Ibid. P. 43.
- *Sokolov I.V., Kachanov V.K., Fiodorov M.B.* Module designing conception for signal generation and processing algorithms in computerized universal hardware-software complex of non-destructive ultrasonic control // Ibid. P. 93.
- *Kachanov V.K., Sokolov I.V., Zaliotkin A.V., Fiodorov M.B.* Measurement accuracy problems at ultrasonic control of complicated-structure articles // Ibid. P. 140.
- *Sokolov I.V., Kachanov V.K., Fiodorov M.B., Avramenko S.L.* Ultrasonic resonant thickness meter with multiplicative signal processing // Ibid. P. 189.
- *Kachanov V.K.* Control of PCM articles with large thickness by special information processes // Non-destructive control: reference in 7 vol. / under edition of V.V. Kliuev. V. 3. Ultrasonic control. Mashinostroenie Publisher, 2005. P. 542—554.
- *Bodrov V.N., Obidin V.N., Rassel M.M.* Experimental results of fast temperature measurement by TV method // Proc. of XIV All-Russia conf. «Modern television». 14—15 of March 2006. MKB Electron Publisher. Moscow. P. 55—57.
- *Bodrov V.N., Ischenko S.V.* Input amplifier for pyro-thermo-imager // Ibid. P. 58—61.
- *Bodrov V.N., Rykov A.N.* Digital module for matching and processing of two different spectral structure images // Ibid. P. 61—63.
- *Bodrov V.N., Obidin V.N.* Photo-sensitive Si CCD matrixes with optimal parameters of absorbing layer // Proc. of XIII All-Russia conf. «Modern television». 15—16 of March, Moscow, MKB Electron Publisher. 2005. P. 75—78.
- *Bodrov V.N., Rassel M.M.* Photo-sensitive CCD matrixes with inherent electronic multiplication // Ibid. P. 78—83.

- *Bodrov V.N., Rykov A.N.* Digital module for multi-channel image signal processing of various spectral ranges // Proc. of XIX Intern. conf. on photo-electronics and night-vision devices. 23—26 of May 2006. Moscow. FGUP Orion publisher. P. 191.

■ **Patents**

- *Patent on useful model MPK 7 A61 N1/44, A 61 H39/02.* Device for air-ion diagnostics, reflexotherapy and identification / V.N. Bodrov, V.N. Khristoforov, B.S. Mel'nikov. 2006.

■ **Partners**

- National Polytechnic Institute (INPT), Toulouse, France
- Federal center of double technologies «Soiuz», Dzerzhinsk, Moscow region.
- Federal state unitary enterprise «All-Russia R&D Institute of Nuclear Power Plants, Moscow
- Central R&D Institute of special materials, Khot'kovo, Moscow region.
- FGUP «NPP Istok», Fiazino, Moscow region «Region» company, Moscow

■ **Unique equipment**

- Setup for metrological attestation of high-sensitive (low-level) receivers of optical emission
- Universal setup for testing and attestation of electron-beam devices for color images
- Setup for characteristic measurement and for metrological attestation of piezo-electrical transducers
- Setup for concrete physical-mechanical characteristics measurement
- Model of absolute black body for spectral equipment attestation

At LE department:
21 teachers,
8 Ph.D. students.

Head of department
Doctor of technical sciences,
Associated-Professor Andrey A. GRIGORIEV

■ Main Lines of Research

Research Supervisor

- **Development and implementation of new high-efficient discharge emission sources in visible and UV spectrum regions**
Professor Ataev A.E.
- **Mathematical modeling methods for emission transfer processes in scattering and absorbing medium**
Professor Budak V.P.
- **Realistic modeling of illumination images for three-dimensional scenes on PC monitor screen**
Professor Budak V.P.
- **Optical-electronic image system parameters optimization for image visualization on the basis of organ of vision statistical model**
Associated-Professor Grigoriev A.A.
- **Optical-electronic devices for medicine**
Professor Lariushin A.I.
- **Development of methods for illumination and color image reproduction quality estimation**
Associated-Professors Lebedkova S.M., Snetkov V.Yu.
- **Architectural illumination, light engineering design and visual perception ecology**
Professor Matveev A.B.
- **Investigation of receiver spectral characteristics and emission sources influence on the photometry errors**
Associated-Professor Petrov V.M.
- **Mathematical modeling methods for physical processes in gas-discharge emission sources and experimental investigation of processes in plasma**
Professor Reshonov S.P., Eliseev N.P.
- **Development of high-quality light-optical system of visible and IR ranges**
Associated-Professor Rychkov V.I., Yakushenkova T.I.

■ Agreements, contracts, projects supported by the state budget

- Investigation of mathematical models for emission reflection by muddy medium with arbitrary 3-D geometry and anisotropic dispersion
- Development of observer perception theory for noisy images

■ Key publications

- *Boudak V.P.* Convergence Acceleration of a Spherical Harmonics Method for Strong Anisotropic Scattering // Proc. of IRS 2004: Current problem in atmospheric radiation. Hampton, VI: A.Deepak Publishing, 2006. P. 47—50.

- *Budak V.P., Lubenchenko A.V.* Precision and Application Range of Quasi-Single Scattering Approximation at the Calculation of the Backscattering Signal // Proc. SPIE, 2006. Vol. 6160. P. 285–290.
- *Budak V.P., Melamed O.P.* Green's Function Calculation of the Radiative Transfer Equation in the Media with Anisotropic Scattering // Ibid. P. 291–296.
- *Budak V.P., Korkin S.V.* Calculation of Polarization Parameters of Light Fields in Turbid Media with an Anisotropic Scattering // Ibid. P. 297–302.
- *Budak V.P.* Effective Computational Method of Light Fields in Three-Dimensional Media With an Anisotropic Scattering // Ibid. P. 303–307.
- *Budak V.P., Korkin S.V.* Mathematical Model of the Polarized Light Reflection by the Turbid Medium Slab With an Anisotropic Scattering // Proc. SPIE. 2005. Vol. 5888. P. 363–370.
- *Budak V.P., Korkin S.V., Melamed O.P.* Effective Computational Method of the Light Fields in 3D Medium with Anisotropic Scattering // Proc. SPIE. 2005. Vol. 5979. P. 125–130.
- *Budak V.P., Makarov D.N., Smirnov P.A.* Computer Programmes for Lighting Design // Light and Engineering. 2005. Vol. 13. No 2. P. 18–24.
- *Budak V.P., Makarov D.N., Smirnov P.A.* П'ехле о роговнбн ролитаКов" програмъ pro nevrhovбн osvetlovасчч soustav // Svetlo. 2006. No 1. S. 50–54.chd.
- *Budak V.P., Petrovichev A.V.* Realistickй modeliroвнн zobrazenn osvтленн 3D счйн на стннтку proèita // Svetlo. 2005. No 3. P. 38–40.æ
- *Budak V.P., Smirnov P.A.* The Derivation of Integral Features of Luminous Feld Using Ray Concepts // Light and Engineering. 2005. Vol. 13. No 3. P. 60–65.
- *Grigoryev A.A., Desiatov A.A.* Quasioptimal Filtration Algorithm for Noised Images Processing Based on Statistical Solutions Theory // Pattern Recognition and Image Analysis: Advances in Mathematical Theory and Applications. 2005. Vol. 15. P. 78–85.
- *Al-Husban Ya., Smirnov P.A.* Natural light estimation in light-climate conditions of Amman, Jordan // Svetotekhnika. 2005. No 5. P. 68.
- *Ataev A.E., Fediukina G.V.* light Engineering history: reference book: Energoatomizdat Publisher, 2005. P. 23–35.
- *Kozel'skiy A.V.* About the accuracy and application boundaries of small-angle approximation // Optics of atmosphere and ocean. 2005. V. 18. No 1. P. 38–44.
- *Budak V.P., Makarov D.N.* Possibilities of 3D modeling for light engineering design / / Svetotekhnika. 2005. No 6. P. 36–39.
- *Makarov D.N., Budak V.P.* Multiple reflection role for street natural illumination // MPEI Vestnik. 2005. No 2. P. 88–92.
- *Budak V.P., Melamed O.P.* Modified method of spherical harmonics for dispersion function determination of muddy medium layer point // Optika atmosfery i okeana. 2006. V. 19. No 12. P. 1–6.
- *Budak V.P., Melamed O.P.* Dispersion function determination for muddy medium layer point at arbitrary distributed optical parameters // MPEI Vestnik. 2006. No 6. P. 152–156.
- *Budak V.P., Smirnov P.A.* Integral characteristics of light field on the basis of beam representations // Svetotekhnika. 2005. No 5. P. 44–48.
- *Budak V.P., Smirnov P.A.* Designing of light installations with usage of global illumination principles // Svetotekhnika. 2005. No 1. P. 10–14.

- *Gutzait E.M., Zhidkov R.A., Kusch O.K., Sokol'tsov S.V.* Illumination device characteristic analysis for toroidal non-electrode lamp in cylinder resonator with wave mode H011 // Svetotekhnika. 2006. No 3. P. 77–80.
- *Lebedkova S.M., Smirnov P.A.* Sanitary and hygiene condition estimation for class illumination of several Moscow schools // Svetotekhnika. 2005. № 4. P. 51–55.
- *Suslin K.V., Shkurskiy B.I.* Image quantization method // Opticheskiy zhurnal. 2005. No 12. P. 18–22.

■ **Partners**

- «Lisma» company, Saransk, Mordovia
- «Elektroluch» company, Moscow
- «Moscow Electrical Lamp Plant», Moscow
- Technical University of Bratislava, Slovakia
- Technical University of Shanghai, China
- Technical University of Beijing, China
- Special Design Bureau of Night Vision Engineering «Orion», Moscow
- All-Russia R&D Light Engineering Institute named after Vavilov, Moscow
- Ilmenau Technical University, Germany
- Karlsruhe University, Germany

■ **Unique equipment**

- Installation for automated investigation of spectral characteristics of light sources and reflected materials
- Equipment for data collecting in computer on the basis of National Instruments PCI-6024E board with software LabVIEW 7.1 by NI

At IE department:
23 teachers,
12 Ph.D. students.

Head of department
Doctor of technical sciences,
Professor Dmitry I. PANFILOV

■ Main Lines of Research

Research Supervisor

- **Development and investigation of intellectual power modules and converter devices on its basis including with the specific characteristics**
Associated-Professor Tsarenko A.I.
- **Development and investigation of power semiconductor switches of new technology**
Associated-Professor Voronin P.A.
- **Development and investigation of electric supply sources for discharge lamps of high efficiency**
Professor Panfilov D.I., senior researcher Polyakov V.D.
- **Investigation and development of electric supply sources for electronic equipment of wide purposes**
Associated-Professors Golikov V.Yu., Nedoluzhko I.G.
- **Power electronic means control**
Associated-Professor Obukhov S.G.
- **Microprocessor system for illumination control**
Professor Panfilov D.I., senior researcher Polyakov V.D.
- **Development and investigation of car electronics facilities**
Professor Panfilov D.I.
- **Development of microprocessor facilities for industrial automation**
Associated-Professor Remizevich T.V.

■ Agreements, contracts, projects supported by the state budget

- Measurement of static and dynamic characteristics of experimental modules H-IGBT in full range of its output parameters
- Development of power module test technique in the mode of rigid switching, investigation and transistor operation analysis for inductive load
- Development of methods for analysis, investigations and optimization of multi-channel transistor structures in single-stage test mode
- Development of educational laboratory setup for investigation of Infineon company supply sources
- Development of high-efficient starting-regulation devices for economic gas-discharge illuminating lamps for Moscow objects
- Development of controlled electronic starting-regulation devices for arc sodium lamps DnaT-250
- Energy saving technologies implementation in area of street illumination using new technologies and modern element base
- Development of pulse and sinusoidal signals sources for high-voltage tests of electric equipment

- Development of demonstrational electronic starting-regulation device
- Development of electric supply sources for moving objects
- Converter development for inherent power supply of urban electric transport
- Electric supply systems development for hydrogen batteries
- Development of electric power systems for aerodrome light engineering complexes
- Development of special power supply sources for powerful laser technological installations
- Development of power supply sources for industrial electric arc welding
- Development of power supply sources for xenon lamps in projection equipment
- Development of effective power supply sources for personal computers
- Development of effective power supply sources for cellular communication equipment
- Development of power measurement module for system of measurement and account of electric energy parameters at electric substations 35/110 kV
- Development of diagnostic unit for control system of automated operation heaters 15.8106, 14.8106 and its modifications

■ Key publications

- *Built-in systems*. Designing of applications on micro-controller 68YC12/ HCS12c family with C language application / under edition of D.I. Panfilov, S.F. Barret, D.J. Pak: «DMK Press Publisher». 2006. 490 p.
- *Orcad* PSPICE and circuit analysis / under edition of D.I. Panfilov, J. Geoun: «DMK Press Publisher». 2006. 520 p.
- *Panfilov D.I., Sokolov A.M.* Channel GSM/GPRS implementation in wireless systems of information acquisition and transmission // *Seti i sistemy cviazi*. 2006. No 6. P. 86—91.
- *Voronin P.A.* Power semiconductor switches. Families, characteristics, application. — 2nd edition: Dodeka Publisher, 2005. P. 384.
- *Voronin P.A., Shchepkin N.P., Bonomorskiy O.I.* Fast-acting cascade switch with field control. Power electronics, appendix to journal // *Komponenty i tehnologii*. 2005. No 1. P. 42—44.
- *Voronin P.A., Shchepkin N.P., Bonomorskiy O.I.* Comparative analysis of power switching transistor effectiveness with field control. Power electronics, appendix to journal // *Komponenty i tehnologii*. 2005. No 2. P. 12—14.
- *Voronin P.A., Shchepkin N.P.* Hybrid IGBT — static and dynamic characteristics. Power electronics, appendix to journal // *Komponenty i tehnologii*. 2006. No 3.
- *Lebedev A.G., Nedoluzhko I.G.* Bipolar transistor modeling and its parameter determination // *Silovaya elektronika*. 2005. No 1.
- *Kaiukov D.S., Nedoluzhko I.G.* Modification of Pspice model of magnetic core // *Silovaya elektronika*. 2005. № 1.
- *Lebedev A.G., Nedoluzhko I.G.* Technique for Pspice modek determination of IGBT transistor // *Silovaya elektronika*. 2005. No 2.
- *Kaiukov D.S., Nedoluzhko I.G.* Parametric synthesis of control scheme for switching power source // *Silovaya elektronika*. 2005. No 3.
- *Glebov B.A., Lebedev A.G., Nedoluzhko I.G.* Calculation of damping chains using SPICE for transistor switches of voltage converters // *Silovaya elektronika*. 2005. No 4.

- *Remizevich T.V.* Micro-controllers Cold Fire from Freescale Semiconductor — new development method. Part 1 // *Silovaya elektronika*. 2006. No 7. P. 18—25; Part 2 // *Silovaya elektronika*. 2006. No 8. P. 12—15.
- *Chaplygin E.E.* Asymmetric modes of three-phase converter with power factor correction // *Elektrichestvo*. 2005. No 9. P. 55—62.
- *Chaplygin E.E., Kalugin N.G., Rybal'chenko I.Yu.* Input filters of voltage inverters with asymmetric load // *Prakticheskaya silovaya elektronika*. 2005. No 18. P. 28—32.
- *Chaplygin E.E., Nguen Hoang An.* Spectral models of pulse converters with variable commutation frequency // *Elektrichestvo*. 2006. No 34. P. 39—46.
- *Chaplygin E.E., Nguen Hoang An.* Control methods for Vienna-rectifier // *Prakticheskaya silovaya elektronika*. 2006. No 21. P. 28—32.
- *Obukhov S.G., Efimov A.S., Rybalchenko I.Yu.* Investigations of matrix converter with Pspice system application // *Elektricheskie sistemy i kompleksy: Magnitogorsk*. 2006. P. 237—244.
- *Obukhov S.G., Korovin V.V.* Modulation methods for creation of three-phase pulse converters // *Prakticheskaya silovaya elektronika*. 2005. No 19. P. 38—44.
- *Obukhov S.G., Samutsevich E.S.* Imitation modeling of vector control systems by MATLAB package // *Prakticheskaya silovaya elektronika*. 2005. No 20. P. 21—23.
- *Obukhov S.G., Zhdanov E.V.* Optical sensor of electric parameters of discharge lamp // *Proc. of XI Intern. conf of students: MPEI Publishing House*, 2005.
- *Obukhov S.G., Sankin A.A.* Multi-cell sources for secondary electric supply // *Ibid.*
- *Smirnov E.M., Panfilov D.I., Polyakov V.D.* Structure principles for automated control systems for illumination // *CHIP NEWS*. 2005. No 10. P. 10—15.
- *Polyakov V.D.* Dynamic properties of pulse electric supply systems at operation on the gas discharge // *MPEI Vestnik*. 2005. No 2. P. 93—101.
- *Polyakov V.D., Puzanov V.A.* Peculiarities of analysis and calculation of electronic ballast for discharge high-voltage lamp power supply by the low frequency rectangular current // *Prakticheskaya silovaya elektronika*. 2006. No 20. P. 21—23.

■ Patents

- *Patent 55515 RF.* Protection circuit for upper power switch against load short circuit / Panfilov D.I., Arkhipov A.M. Registered at 10.08.2006
- *Patent 2268545 RF.* Semiconductor switching device / P.A. Voronin, O.I. Bonomorskiy. 2006.
- *Patent 47608 RF.* Regulated device for luminescent lamp supply / V.D. Polyakov, E.M. Smirnov. Registered at 27.08.2005.

■ Partners

- «ElTom» company, Tomilino town, Moscow region.
- «R&D Institute of Distant Radio Communication», Moscow
- «Transvit» company, N. Novgorod.
- «Nizhegorodskiy zavog Frunze», N. Novgorod
- «Zavod Stella», Zelenograd
- «Reconstruction of greenhouses», Moscow
- «GE Lighting» company, USA
- «Infineon Technologies AG» company, Germany
- «Prozhektor-Elektrotehnika», Moskva
- State Unitary Enterprise «Prozhektor», Moscow

- R&D Kino-Photo Institute, Moscow
- R&D Center of Technological Lasers, Shatura, Moscoe region
- «Blesk-NVF» company, Moscow
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin, Moscow
- ABB Metronix, Moscow
- «AVTOVAZ» company, Toliatti «SHAZ» company, Moscow region
- «KAMAZ» company, Naberezhnye Chelny R&D Institute «Avtoelektronika», Moscow «Elektromodul'» company, Belarus

■ **Unique equipment**

- Laboratory complex of power equipment of «Apator SA» company, Poland Laboratory-research complex of Motorola company, USA
- Intellectual-integrated modules of Mitsibishi company, Japan
- Digital phosphor oscilloscope of Tektronix company series TDS3054 (pass band 500 MHz)
- Universal measurement complex for dynamic parameters of power transistors (single-test mode, communication of digital measuring data to PC, software control)

At SE department:

18 teachers,

2 researchers,

5 Ph.D. students.

Head of department Doctor of technical sciences,

Professor, Honoured Researcher of RF

Anatoly I. POPOV

■ Main Lines of Research

Research Supervisor

□ **Physics of non-crystalline semiconductors and devices based on them**

Professors Popov A.I., Voronkov E.N.

□ **Electronic microscopy, scanning tunnel and atomicforce microscopy**

Professor Popov A.I.

□ **Development of semiconductor sensors. Investigation of electric-physical and noise properties of semiconductor devices and structures**

Professor Gulyaev A.M.

□ **Investigations of A^2B^6 semiconductor compounds and devices**

Professor Morozova N.K.

□ **Investigation of Si-based MIS structures and field-effect-transistors**

Professor Soldatov V.S.

□ **Optical modulation spectroscopy of semiconductors**

Associated-Professor Khirin V.N.

□ **Development of power semiconductor devices**

Associated-Professors Makarov V.A., Charykov N.A.

□ **Optical-electronic structures based on vanadium oxides**

Associated-professor Kornetov V.N.

□ **Solid-state microvare electronics**

Professor Shnitnikov A.S.

□ **Electronic spectroscopy of semiconductor surfaces**

Associated-Professor Varlashov I.B.

□ **Infrared detectors**

Professor Miroshnikova I.N.

■ Agreements, contracts, projects supported by the state budget

□ Electronic-microscopic and electronic-graphical investigation of semiconductors materials

□ Investigation of nano-crystalline and amorphous semiconductor films and structures on its basis

□ Investigations of phenomena caused by carrier heating in the channel of MIS transistors and development of monitoring methods for MDS ultra-large IC stable to the hot carrier effects

□ Investigation of heterogeneous reactions on the surfaces of semiconductor material and structure

■ Key publications

- *Kozyukhin S.A., Fairushin A.R., Voronkov E.N.* Amorphous chalcogenide films properties. Properties of amorphous arsenic selenide films modified by complex compounds of rare-earth elements // FTP. 2005. V. 39. No 8. P. 1012–1015.
- *Kozyukhin S.A., Fairushin A.R., Voronkov E.N.* Amorphous Arsenic Chalcogenide Films Modified Using Rare-Earth Complexes // Journal of Optoelectronics and Advanced Materials. 2005. Vol. 7. № 3. P. 1457–1461.
- *Savinov I.S.* Electrical fatigue beginning in MOS structures due to barrier height decreasing at field dielectric atoms ionization // FTP. 2005. V. 39. No 5. P. 623–626.
- *Kozyukhin S.A., Voronkov E.N., Kuz'mina N.P.* Amorphous Arsenic Chalcogenide Films Modified Using Rare-Earth Complexes // J. of Non Cryst. Solids. 2006. No 352. P. 1547–1550.
- *Fairushin A.I., Popov A.I., Savinov I.S., Voronkov E.N.* Percolation breakdown of amorphous semiconductors // Ibid. P. 1578–1581.
- *Popov A.I., Savinov I.S., Voronkov E.N.* Simulation of Phase – Change Processes in Nonvolatile Memory Cells // Ibid. P. 1624–1627.
- *Anisotropy* of nano-composite electrical conductivity with silicon-carbonic matrix contained the nano-phase on the basis of tungsten / N.D. Vasilieva, G.F. Vorob'iova, M.D. Malinkovich etc. // Proc. of V Intern. conf. «Amorphous and crystalline semiconductors». Sankt-Peterburg: FTI RAS Publisher. 2006. P. 247–248.
- *Maslov S.I., Popov A.I., Serebryannikov S.V.* Electronic academic resources of Moscow Power Engineering Institute (Technical University) // Otkrytoe obrazovanie. 2006. No 4 (57). P. 21–27.
- *Investigation* of oxygen influence on cathode-luminescence spectra and on the restricted zone width of ZnS_xSe_{1-x} / N.K. Morozova, I.A. Karetnikov, E.M. Gavrishuk etc. // FTP. 2006. No 10. V. 40. P. 1185–1190.
- *Morozova N.K., Karetnikov I.A., Gavrishchuk E.M., Mideros D.A.* 3 Restricted zone of ZnS_xSe_{1-x} dependence on the structure // Noise and degradation processes in semiconductor devices: MPEI Publisher, 2006. P. 163–168.
- *Morozova N.K., Mideros D.A., Gavrishchuk E.M.* Self-Activated Luminescence In $ZnS - ZnSe$ System From Positions Of The Band Anticrossing Mode I// II Intern. Congress on Radiation Physics and Chemistry of Inorganic Materials, High Current Electronics, and Modification of Materials with Particle Beams and Plasma Flows. Tomsk. 2006.
- *Gulyaev A.M., Miroshnikova I.N.* Face to face to spintronic // Noise and degradation processes in semiconductor devices (metrology, diagnostic, technology): Proc. of sem. 15–18 of Nov. 2005. MNTORES Publisher. 2006. P. 22–32.
- *Miroshnikova I.N.* Degradation process analysis of photo-resistor on the base of indium antimonide // Ibid. P. 52–58.
- *Transient* Injection and Fast Switch on in p-i-n Diodes / T.T. Mnatsakanov, A.G. Tandoev, S.N. Yurkov et. al. // Journal of Applied Physics. 2006. Vol. 99. No 7.
- *Peculiarities* of switching-off process of power integrated thyristor with external field control / I.V. Grekhov, S.N. Yurkov, T.T. Mnatsakanov etc. // Zhurnal tekhnicheskoy fiziki. 2006. V. 76. No 5. P. 76–81.
- *Mnatsakanov T.T., Levinshtein M.E., Freidlin A.S., Palmour J.W.* On the Thermal Stability of High-Voltage Rectifier Diodes // Semiconductor Science & Technology. 2006. Vol. 21. № 9. P. 1244–1249.
- *Mnatsakanov T.T., Yurkov S.N., Tandoev A.G.* Power semiconductor electronics on the way to wide-zone materials // Elektrichestvo. 2006. No 9. P. 56–61.

- *SiC thyristors* / M.E. Levinshstein, S.L. Romyantsev, T.T. Mnatsakanov et. al. // «SiC Materials and Devices vol. 1», ed. by M.S. Shur, S.L. Romyantsev and M.E. Levinshstein, World Scientific. 2006. P. 227—292.
- *Atmosphere* analyzed on the basis of resistive gas sensor matrix / A.M. Guliaev, M.A. Slepniova, D.A. Chekhovskiy etc. // Izmeritalnaya tekhnika. 2006. No 2. P. 59—61.
- *Gulyaev A.M., Sarach O.B., Slepniova M.A.* «Electronic nose» on the gas sensor matrix // Proc.of Xi Intern/ conf «Electromechanics, electrotechnologies, electrical materials and components: MKEEE-2006. 2006. Part 1. P. 85.
- *Gudkova N.B., Shnitnikov A.C.* Wave-guide diode restrictor of mm range // Proc. of XVI Intern. Crimean conf. «UHF engineering and telecommunication technologies». Sevastopol. 2006. V. 1. P. 123—124.
- *Kopelev I.B.* Modeling of phase transfer crystal-amorphous state // Ibid. P. 188—189.
- *Voronkov E.N., Kozyukhin S.A., Mikerina E.I.* Electrical characteristics of amorphous films of As₂Se₃, contained oxygen // Ibid. P. 269—270.
- *Kozyukhin S.A., Vasilieva N.D., Babenko E.A.* Complex compound PZE Ln(Thd)₃ (Ln=Eu, Tb, Yb) influence on film surface morphology for arsenic three-selenide // Proc. of V Intern. conf. «Amorphous and crystalline semiconductors». Sankt-Peterburg. RAS FTI Publisher. 2006. P. 160—162.

■ Dissertations

- *Miroshnikova I.N.* Deep-cooled photo-receivers on the basis of indium antimonide : Dr. Sci. (Techn.) Dissertation. 2005.
- *Kukoev I.Yu.* Wavelet-analysis of noise processes in semiconductor structures: Cand. Sci. (Phys.Math.) Dissertation. 2005.
- *Slepniova M.A.* Gas sensors on the basis of SnO_{2-x} films for «electronic nose»: Cand. Sci. (Techn.) Dissertation. 2005.
- *Savinov I.S.* Functional characteristics of volatile storage on the base of chalcogenide semiconductors: Cand. Sci. (Phys. Math.) Dissertation. 2006.

■ Partners

- State Unitary Enterprise «Alpha», Moscow
- Research-Industrial Association «Pulsar», Moscow
- Moscow Plant «Sapphire», Moscow
- R&D Institute of material sciences, Zelenograd
- R&D Institute of molecular electronics, Zelenograd

■ Unique equipment

- Complex for investigation of solid state surface chemical structure by methods of X-ray electronic-, Auger-, UV- and mass-spectroscopy LHS-10
- Complex for charging phenomena investigations in MDS structures and transistors by methods of volt-farad characteristics, thermostimulated ion currents, charging pumping
- Automated complex for investigations of semiconductor structures and devices noise features

- ❑ Installations for optical properties investigations of semiconductor materials by methods of IR-and electric modulation spectroscopy and spectrometry
- ❑ Technological equipment for thin dielectric and semiconductor film mapping by methods of ion-plasma, ractive-cathode and thermal sputtering
- ❑ Complex for gas sensors investigations
- ❑ Raster and transparent electronic microscopes
- ❑ Tunnel microscope
- ❑ Atom-force microscope

DEPARTMENTS UNDER RECTORATE

HISTORY AND CULTUROLOGY DEPARTMENT (HC)

Tel: (495) 362-74-23

18 teachers work at HC department
Head of the department

Smirnova Marina I.
Professor, Doctor of History

■ Main Lines of research

Research Supervisers

- **Evolution of individuals, societies and civilizations: people in history and history of everyday life**
Professor Smirnova M.I., Associated Professor Krasnova L.I.
- **History of political parties and movements in Russia**
Professor Smirnova M.I.
- **Historiography of local history of Moscow**
Associated Professor Dmitrieva I.A.
- **Application of computer technologies in the education and development of information culture**
As. Prof. Krasnova L.I., As. Prof. Vinogradova G.Z.
Prof. Vzyatyshev V.F.
- **Peculiarities of Russian culture**
As. Prof. Ermishina N.D.

■ Agreements, contracts, and projects sponsored from the state budget

- **Social and cultural aspects of engineering and their development in the higher education on the basis of interdisciplinary synthesis**
- **Multi-media textbook (CD-ROM) on History of Russia for the system of remote education.**

■ Key publications

- *Russian* historians in the 20th century // Biobibliografichesky slovar. V 2 t. / Ed. A.A. Chernobaev. Saratov: SGSEU, 2005. V.1. 576 p.; V.2 608 p.
- *History* and philosophy of Russian history science: textbook / ed. A.A. Chernobaev. RAGS, 2006. 344 p.
- *World* civilizations of the New Time and the modern time (introduction to the history of world civilizations). Ed. L.I. Krasnova, M.I. Smirnova. MPEI Publishing house, 2005. 216 p.
- *Ermishina N.D., Mikhailov A.N.* Culturology. MPEI Publishing house, 2006. 248 p.
- *Ermishina N.D.* Culturology. «Akademicheskyyi proekt», 2006. 432 p.
- *Krasnova L.I., Churilina T.I.* The Church and the Soviet State during the Great Patriotic War. // MPEI Vestnik. 2006. № 6. p. 173-179.
- *Glezin E.E., Smirnova M.I.* Peculiarities of development of the multi-party political system in Russia (in the mid and late 1980-es) // MPEI Vestnik. 2006. № 3. p. 109-117.
- *Smirnova M.I.* New developments in the historiography of Russian social democracy // World social democracy: theory, history and current situation. M.: Sobranie, 2006.p 19-33.
- *Chernobaev A.A.* With confidence in our victory. From the memoirs of senior sergeant L.S. Kiskin // Istorichesky Arkhiv. 2005. No 2—3. P.20—52
- *Chernobaev A.A., Cherishchev A.V.* Russian army and Authorities in 1917 // Voennostorichesky zhurnal. 2006. No7. P.32—38.

■ Dissertations

- * *Prokopiev S.M.* History concept of Origene of Alexandria: Cand. Sci. (Hist.) Dissertation. 2005

PHILOSOPHY, POLITOLOGY AND SOCIOLOGY DEPARTMENT (PPS)

Ph.: (495) 362-7707, (495) 362-7654,
(495) 362-7915,
Ph/fax: (495) 362-7209

At PPS department:
31 teachers,
2 engineers.

Head of department
Doctor of philosophy sciences,
Professor Andrey L. ANDREEV

■ Main Lines of Research

□ **Modern society: Russia in global context**

Research Supervisor

Professor Andreev A.L.

□ **Modern problems of social philosophy**

Professor Arefieva G.S.

□ **Sociology, social history and education philosophy**

Professor Andreev A.L.

□ **The philosophy of science and technology**

Professor Pechenkin A.A.

□ **Comparative politology**

Associated-Professor Chepel' S.L.

□ **Political culture**

Associated-Professor Vorob'iova I.Ya.

□ **The method of social research**

Associated-Professor Kuz'minov M.Yu.

■ Agreements, contracts, projects supported by the state budget

- Social competences, social practice and social self-organization in Russian socium
- Engineering philosophy (conception substantiation and main dictionary concepts)

■ Key publications

- *Andreev A.L.* Knowledge or competencies? // Higher education in Russia. 2005. No 2. P. 3—11.
- *Andreev A.L.* Interaction of citizens and militia // Vestnik RAS. 2005. V. 75. No 4.
- *Andreev A.L.* Citizen and militia // Vestnik RGNF. 2005. No 4.
- *Andreev A.L.* Competence paradigm in education: experience of philosophy-methodology analysis // Pedagogika. 2005. No 4. P. 19—27.
- *Andreev A.L.* Civil position of Russian educated youth // Vestnik RAS. 2005. V. 75. No 7. P. 587—591.
- *Andreev A.L.* Burocracy. Competence erosion or moral crisis? // Monitoring of social opinion. 2006. No 1.
- *Andreev A.L.* Engineering philosophy in German intellectual tradition // MPEI Vestnik. 2006. No 2. P. 97—103.
- *KostioloV V.S.* Structure of technological knowledge // MPEI Vestnik. 2006. No1. P. 115—123.
- *Izmagurova V.L.* Inherent dialog as the mechanism of conscious development // MPEI Vestnik. 2006. No 4. P. 138—144.

- *Selezniov A.A.* Terrorist organizations in modern Colombia. Round table // Latin America. 2005. No 2. P. 39–40.
- *Pechenkin A.A.* The world view of oscillating chemical reactions // Vestnik MGU. Series 7a, philosophy. 2005. No 6. P. 20–35.

■ **Dissertations**

- *Selezniov A.A.* Colombia: Left radical armed opposition as the subject of inherent state conflict: Cand. Sci. (Polit.) Dissertation. 2006.

■ **Partners**

- Russian Academy of Education, Moscow

RESEARCH CENTER «WEAR-RESISTANCE»

(RC «WEAR-RESISTANCE»)

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Internet site: <http://inc.mpei.ac.ru>

At RC Wear-Resistance:

8 researchers,

31 engineers and technicians,

6 Ph.D. students.

RC Director,

Winner of RF Government Award,

Doctor of technical sciences,

Professor Viacheslav A, RYZHENKOV

■ Main Lines of Research

Research Supervisor

- **Construction material erosion and corrosion processes research, development of surface protection methods of thermal power equipment for TPP, NPP and heat supply systems against the aggressive influence of the operating conditions and environment**

Professor V.A. Ryzhenkov

- **Identification and surface-active substance concentration in water medium of various purpose**

Professor V.A. Ryzhenkov

- **Hydrodynamic processes research and development of tubing system hydraulic resistance decrease methods**

Professor V.A. Ryzhenkov

- **Investigation of interaction processes of liquid particles with hard surface**
- **Resource and operation reliability increase of power engineering equipment on the basis of high-effective nano-composite materials usage**

Professor Selezniy L.I.

Ph.D. (Techn.) Kachalin G.V.

- **Exploitation effectiveness increase for heat-supply and heating systems**
- **Research of thermal-barrier deposit formation processes on the equipment heat-exchange surfaces, development of methods for elimination and prevention of deposit and corrosion products formation**

Senior researcher Kurshakov A.V.

- **Determination of erosion-resistance of constructive materials and protective covering at high-speed interaction with the liquids**

Bodrov A.A.

- **Hydrodynamic research of dynamic pump setting, development of methods for exploitation reliability increase of pumping equipment for the thermal power engineering objects**

Senior researcher Volkov A.V.

- **Development of highly-effective hydrodynamic recyclable systems using the redundant main pressure of technological liquids**

Senior researcher Volkov A.V.

- **Electrical energy produce on the basis of redundant pressure recuperation of main pipe line medium**

Senior researcher Volkov A.V.

■ **Agreements, contracts, projects supported by the state budget**

- Development of technological bases and equipment for energy expense reduction at transporting of the operation and technological medium
- Development and implementation of multi-purpose installation for functional property recovering for hot-water pipe-line inherent surfaces lost the protection zinc layer
- Development of experimental-research base at MPEI (TU) for thin-film nano-composite covering formation for the equipment of fuel-energetic complex
- Increase of pumping equipment functioning reliability and effectiveness by means of modification of dynamical pump setting
- Increase of energy-cavitation and exploitation properties of rotary pumps on the basis of flow condition variation for operating surfaces of pump settings
- Development of protection technology for reinforced-concrete elements of technological constructions against the steam-air medium moisture influence and the frosting under condition of real exploitation
- Execution of composition cleaning, conservation and re-activation of 200 MW power unit equipment on Shatura Power Station
- Development of technique and implementation of pre-production device for identification and concentration determination of surface-active substances in water medium
- Development of technological regulations and implementation of mobile combined installation for surface immunization of exploited heat-exchange equipment and heating devices of heat supply systems

■ **Key publications**

- *Pumping* equipment damage analysis on thermal power engineering objects / A.V. Volkov, S.N. Pankratov // Tiazhioloe mashinostroenie. 2005. No 10. P. 2—6.
- *Identification* of potentially harmful substances in technological medium of TPP / V.A. Ryzhenkov, O.V. Starikova, Yu.M. Sokolova, N.A. Nariadkina // Novoe v rossiiskoy energetike. 2005. No 1. P. 34—41.
- *Net pump* adaptation methods to the real exploitation condition in heat nets / A.V. Volkov, A.I. Davydov, M.Yu. Pomortsev, S.K. Trishkin // Elektricheske stantsii. 2005. No 11. P. 53—57.
- *Incubation* period duration estimate for erosion wear of construction materials / L.I. Seleaniov, V.A. Ryzhenkov // Teploenergetika. 2005. No 4. P. 61—63.
- *Factual* permanent resource determination of eroded working blades of CLP power steam turbine last stages / V.A. Ryzhenkov, A.V. Kurshakov, A.A. Bodrov, I.E. Bokarev / // Novoe v rossiiskoy teploenergetike. 2005. No 12. P. 34—37.
- *Hydrodynamic* features analysis of net pumps in energy 100 MW units / A.V. Volkov, S.N./ ??? Pankratov, A.G. Parygin // Nasosy i oborudovanie. 2006. No 2. P. 25—27.
- *Calculation-experimental* research of hydrodynamic properties of rotary pumps with the hydrophobic setting / A.V. Volkov, S.A. Chernyshov, M.Yu. Pomortsev // Nasosy i oborudovanie. 2006. No 3. P. 42—45.

■ **Patents**

- *Patent 45007 RF*. Device for operation mode regulation of dynamic pump / A.V. Volkov, M.Yu. Pomortsev, V.A. Ryzhenkov // BI. 2005. No 10.

- *Patent 47364 RF*. Device for anti-corrosion covering formation / A.V. Volkov, M.Yu. Pomortsev, V.A. Ryzhenkov // Bl. 2005. No 24.
- *Patent 51619 RF*. Device for dynamic pump setting hydrophobization by means of surface-active corrosion retarding agents usage / A.V. Volkov, M.Yu. Pomortsev, V.A. Ryzhenkov // Bl. 2006. No 6.

■ **Dissertations**

- *Pomortsev M.Yu.* Research of operating medium pH influence on power engineering and cavitation properties of rotary pumps: Cand. Sci. (Techn.) Dissertation. 2005.
- *Ter-Arutiunov B.G.* Research of physical-chemical properties influence of vacuum ion-plasma covering on wear-resistance increase of power engineering equipment constructive materials: Cand. Sci. (Techn.) Dissertation. 2005.
- *Volkov A.V.* Development of effectiveness and reliability increase methodology for the thermal power engineering pumping equipment: Dr. Sci. (Techn.) Dissertation. 2006.

■ **Partners**

- Energy expert association of western Ural, Perm
- «PO Gidromash» company, Moscow
- Department of science and industrial policy of Moscow
- Department of fuel-energy economy of Moscow Government
- Baikov Institute of metallurgy and metal sciences of RAS, Moscow
- «Leningradskiy metallicheskiy zavod» company, Sankt-Peterburg
- «Moscow Committee of science and technology» company
- «Mosenergo» company, Moscow
- Moscow JSC «MOEK»
- RAO «EES Rossii», Moscow
- «Silovye mashiny» company, Moscow
- All-Russia R&D Institute of nuclear power plants, Moscow
- Ministry of science and education of Russian Federation, Moscow
- Ministry of housing and communal services of Moscow region government
- NPO «TSNIITMASH», Moscow
- FGUP «Keldysh R&D center», Moscow
- Russian association of pumping manufacturers, Moscow
- «POMPA» company, Schiolkovo
- «SIGMA» company, Lutín, Czechia
- FGUP «Karpov R&D physical-chemical institute», Moscow
- «ENA» company, Schiolkovo
- Federal Agency on science and innovations, Moscow

■ **Unique equipment**

- Ion-plasma vacuum installation with planar unbalanced double-cathode magnetron system and arc evaporator for protective covering formation, equipment for preparation and cleaning of protected surfaces
- Setup for nano-composite covering formation
- Setup for erosion resistance determination for constructive materials and protective covering at drop-shock influence in accordance with the functionality estimation order

for steam turbine operating blades during the manufacture, exploitation and repair (RD 153-34.1-17.462-00)

- Complete equipment for corrosion research and testing fulfillment
- Mobile setup for elimination and deposit formation prediction with the concurrent protection against the corrosion of tubes and thermal power engineering equipment
- Microscopes: optical inverted with micro-hard measuring adapter, scanning balloon-borne, transmission, focused beam

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At MPEI Science-Park:

18 employees

Head of «MPEI Science-park»
 Doctor of technical sciences,
 Professor Nikolay D. ROGALIOV

■ Main Lines of Research

Research Supervisor

- **Management and organization of research activity in higher educational institutions**

Professor Klimenko A.V.

- **Technological transfer, management and technology commercialization**

Professor Rogaliov N.D.

■ Agreements, contracts, projects supported by the state budget

- Creation and development of «Technology Transfer Center» at MPEI
- Development of algorithm for choosing the method of intellectual property object estimation created in technical university
- Development of integrated (joint) system for innovation activity support of techno-parks at South-East part of Moscow
- Business plan development with purpose of manufacture organization of steam and hydro-steam small power turbines with back pressure for communal boiler houses
- Business plan for manufacture conversion of magnetic liquid level indicators
- Development of business plan on serial production organization of electric motors of new generation

■ Key publications

- Kalinina M.V., Rogaliov N.D., Fiodorov E.V. Management and technology commercialization of intellectual properties in universities // Proc. of VI All-Russia conf of students «Energy of youth – to Russia economics». P.2. Tomsk: TPI Publisher, 2005.
- Solomatova M.V. Process of intellectual property commercialization in technical university // Proc. of Russian confer. «Science and education—2005», P. 1. Neftekamsk, 2006. P. 291—295.
- Solomatova M.V. Normative base of intellectual property commercialization in technical university // Proc. of Intern. conf. «Sovremennye problemy ekonomiki, upravlenia i urisprudentsii»: Elektronny resurs, Murmank State Univ. Publisher. 2006.
- Rogaliov N.D., Solomatova M.V. About lawful status of intellectual property objects created on the base of state budget in the university // Innovations. 2006. No 5.
- Solomatova M.V., Rogaliov N.D. Development and application of algorithm for method estimation choice of intellectual property objects on the example of Moscow Power Engineering Institute // Proc. of VII All-Russia conf. of young researchers «Youth. Education. Economics». Yaroslavl': «Remder» Publisher. 2006. 396 p.
- Solomatova M.V. Problems caused at way of innovation activity realization in Russian technical universities and ways of its solution on the example of Moscow Power Engineering Institute // Proc. of XI Intern. conf. «Relevant problems of innovation activity development»: Appendix to Collection «Problems of Crimea development». Simferopol: ARK Publisher. 2006. 152 p.

- Solomatova M.V. Forms of university international co-operation in area of innovation activity // INNOVATIKA—2006. V. 1: Ul'yanovsk: UIGU Publisher, 2006. 108 p.

■ **Partners**

- Association «Tekhnopark», Moscow
- Innovation-technological centers union, Moscow
- Institute of innovations, creativity and capital, University of Texas at Austin, USA
- «BADA» corporation at Harbin polytechnic Institute, China
- Research-methodic center on innovation activity, Tver University, Tver
- Science-Park at Warwick University, UK
- Assistance foundation for small forms of enterprise in research-technological sphere, Moscow
- Assistance foundation for innovation activity in higher education institutions, Moscow

■ **Unique equipment**

- Education program «Technology commercialization» created on the basis of a module principle including large text material, educational video movies

INNOVATION-TECHNOLOGY CENTER

Institute Director **Director Doctor of technical sciences, Professor Nikolay D. ROGALEV**
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Internet site: www.sprk.ru
Divisions of innovation-technological center of MPEI

Institute departments

- **«UVK SAYANY» Co**
- **«NPK MEDIANA-FILTER» Co**
- **«MERA» Co**
- **«NEIROCOM» Co**
- **«ENTEK» Co**
- **«ESKOTEK» Co**
- **«NPP TSIKL-PLUS» Co**
- **«INTRON PLUS» Co**
- **Russian-Chinese technopark**
- **«FREINDSHIP»**
- **«ENERGOCONTROL» Co**

At IVK-SAYANY Co.:
22 employees

General Director
Igor V. KUZNIK

■ **Main directions of activity**

- Development and implementation of electronic units for heat-counters (heat-calculators)
- Development and manufacture of primary transducers for water, gas, oil-products consumption
- Manufacture of temperature transducers of resistive type
- Design, manufacture, attestation execution of spill verifying setups
- Software development for heat and heat-carrier registration automation
- Manufacture of housing heat-counters and water counters
- Creation of normative documents
- Agreements, contracts, projects supported by the state budget
- Agreements and contract on heat- and water-counters deliver and other equipment of own manufacture

■ **Key publications**

- *Kuznik I.V.* Russian heat-supply. Registration and exploitation: Esse. MPEI Publishing house, 2006. 132 p.

■ **Partners**

- More that 60 dealers in different regions of Russia including Western and Eastern Siberia and Far East

■ **Unique equipment**

- Spill verifying setup for testing and calibration of water-counters in the range from 15 to 100 mm

Ph.: (495) 234-1660, (495) 362-7475,
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 Internet site: http://mediana-filter.ru

At NPK Madiana-Filter Co.:
 2 Doctors of sciences,
 11 Ph.D.

General Director
 Doctor of sciences (Phys.Math.)
 Alexei A. PANTELEEV

■ Main Lines of Research

Research Supervisor

- **Development of modern complex systems of water treatment for medicine, pharmaceuticals, energetic, microelectronics**
 Dr. Sci. (Phys.Math.) Pantelev A.A.
- **Development of ecologically pure technologies of water treatment for industrial thermal energetic**
 Dr. Sci. (Phys.Math.) Pantelev A.A.

■ Agreements, contracts, projects supported by the state budget

- Development and manufacture of inverse osmosis setup with 150 m³/h performance for Novocherkassk TPP
- Development and manufacture of ultra-filtration setup with 250 m³/h performance for Novocherkassk TPP
- Development and manufacture of inverse osmosis setup with 150 m³/h performance for Pervomaiskaya TPP
- Development of water treatment technology, design and delivery of main technological equipment for TPP 22 «Mosenergo» with performance 1350 m³/h on softened water and 450m³/h on demineralized water
- Development and manufacture of complex water treatment setup for TPP-16 «Mosenergo» with performance 200 m³/h
- Development of technology, setup design and manufacture for deeply deionized water with performance 25 m³/h for Istok company
- Development of technology, setup design and manufacture for deeply deionized water with performance 5 m³/h for Monocrystal company
- Development of technology, setup design and manufacture for deeply deionized water with performance 5 m³/h for NIIS company
- Development of technology, design and manufacture of laboratory class setups for deionized water production

■ Key publications

- *Gromov C.L., Pantelev A.A., Fedoseeva E.B., Uglov S.A.* Small-waste and ecologically pure technology of water treatment for heat net injection // Energetik. 2005. No 3.
- *Inverse* osmosis method application for water treatment in thermal energetic / A.N. Samodurov, S.E. Lysenko, S.L. Gromov etc. // Teploenergetika. 2006. No 6. P. 26–30.

- *Gromov S.L., Panteleev A.A.* Technologies of countercurrent ionite regeneration. P.1. // Teploenergetika. 2006. No 8. P. 33—37.
- *Gromov S.L., Panteleev A.A.* Technologies of countercurrent ionite regeneration. P.2. // Teploenergetika. 2006. No 11. P. 50—55.

■ Patents

- *Patent 2253505 RF.* Filtration module / A.A. Panteleev, S.A. Uglov, S.L. Gromov, A.E. Prokhod'ko. 2005.
- *Application No 2005125388/15(028527) dated 10.08.2005.* Positive decision dated 22.11.2006. Water treatment method / A.A. Panteleev, S.L. Gromov, A.R. Sidorov, S.A. Uglov.

■ Partners

- Dow Chemical, USA
- Moscow Power Engineering Institute (technical university)
- «All-Russia Heat Engineering R&D Institute» company, Moscow
- «Innovation Agency» company, Moscow
- Moscow State University of Engineering Ecology, Moscow

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 Internet site: www.mera-device.ru

At MERA Co.:
 47 employees

General Director Ph.D. (Techn.)
 Sergey S. GROKHOVSKIY

■ Main Lines of Research

Research Supervisor

- **Research of dynamic characteristics of vibro-frequency force sensors on the base of crystal piezo resonators**
 Ph. D. (Techn.) Prokhorov N.I.
- **Methods and facilities for metrological parameter testing of force-sensitive piezo resonators**
 Ph. D. (Techn.) Prokhorov N.I.
- **Development of automated system for constructive parameter modeling and calculations for force sensor elastic elements**
 Ph. D. (Techn.) Prokhorov N.I.
- **Development of adaptive control algorithms in measuring systems using piezo-crystal sensors**
 Luschikov R.I.

■ Agreements, contracts, projects supported by the state budget

- Development and manufacture of equipment for gas turbine balancing «Mera-ISM»
- Development of digital information system for ecological monitoring of living zone
- Development, manufacture and delivery of crystal digital strain sensors
- Manufacture and delivery of multi-range electronic scales of wide spectrum of application
- Manufacture of automated batchers for liquid and bulk components

■ Key publications

- *Grokhovskiy S.S., Prokhorov N.I.* Normative support of multi-range devices for mass measurement // Mir izmereniy. 2006. No 12. P. 6—9.
- *Multi-range* device characteristics for mass measurement and its metrological testing features // Glavny metrolog. 2006. No 4.

■ Partners

- «Salut» company, Moscow
- «Bolshevik» company, Moscow
- «Saturn» company, Rybinsk
- «Cheriomushki» company, Moscow
- «VILS» company, Moscow
- Piliugin SIC of automation and instrumentation, Moscow
- «Motor Cich», Zaporozhie, Ukraine
- Official dealers and technical service centers system in Moscow and Russia regions – more than 100 companies

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(495) 362-7853,
fax: (495) 362-7143
E-mail: info@neurocom.ru

At «Neirokom» Co.:
3 Dr. Sci. (Phys.Math.),
8 Ph.D.

General director,
Ph.D. (Med.) Viacheslav M. SHAKHNAROVICH

■ Main Lines of Research

- Development, manufacture preparation and manufacture:
- equipment for radio telemetry of special and general purposes;
- safety devices and systems for railway transport;
- specific sensors and special power sources;
- technical facilities for noninvasive medical and psycho-physiological diagnostics;
- Special software;
- Person-operator physiological condition monitoring systems and his condition control with the aid of his operation maximal effectiveness achieving;
- special device families with biological feedback for training in self-regulation and treatment.
- Company has its own premises and qualified radio engineers, adjusters, assembling metalworkers, has modern technological equipment. The most part of equipment developed by company is manufactured in its own workshops or on the basis of co-operation with defense conversion enterprises. The manufacture is licensed. All products are certified. The branching acceptance of the products is organized in company
- «Neirokom» developed and manufactures:
 - pressure indicators 115 and 115A (for Russian railways);
 - safety device in ALSN L116U system (for shunting locomotives);
 - brakes blocking device;
 - regulated voltage converter for electric-pneumo brakes of passenger trains;
 - telecontrol system of engine operator wake up;
 - universal psycho-diagnostic complex;
 - automated system for health condition determination by the experts;
 - telecontrol equipment for testing and exploitation of space, missile and airplane objects;
 - special equipment for moving object monitoring;
 - Some products are under the exploitation testing

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At «ENTEK» Co.:
84 employees, among them
1 Dr. Sci. (Techn.),
2 Ph.D. (Techn.)

General Director Ph.D. (Techn.)
Alexander B. KOZHIN

■ Main Lines of Activity

- **R&D execution for development of high and resource-saving technologies in area of energetic. R&D are fulfilled on the base of Steam and Gas Department laboratories of Moscow Power Engineering Institute**

Professor Zariankin A.E.

- **Development, modernization, manufacture and delivery to thermal power plants of the deport units to energetic equipment**

Deputy general director on manufacture Yakimychiev S.V.

- **Constructing-and-mounting operation fulfillment; outward and inward engineering net and equipment mounting; mounting of heat-power equipment, compressors, pumps and fans, gas cleaning equipment, technological metal constructions; start-adjusting operations for heat-power equipment, refrigerating and compressor installations, water supply, sewerage and heat supply systems; vibro-diagnostics of TPP equipment**

General director Kozhin A.B.

- **Development of software for PC**

Ph.D. (Techn.) Arianov S.V.

■ Agreements, contracts, projects supported by the state budget

- Manufacture and delivery of valves with unloading or without unloading for turbines of various power
- Manufacture and delivery of padding for RVP in the form of ball lattice packet
- Manufacture and delivery of gate consumption regulators for liquid and gaseous medium for pipe-lines with large diameters
- Manufacture and delivery of dynamic power surge delimiter for NPP steam turbines
- Manufacture and delivery of fortex-extinguisher on steam lines

■ Partners

- Steam and Gas Turbines department of MPEI (TU), Moscow
- TPP-26 Mosenergo, Moscow
- TPP-23 Mosenergo, Moscow
- TPP-22 Mosenergo, Moscow
- «Alstom Power» plant, Poland
- «Innovation agency» company, Moscow
- «Mosenergomontazh» company, Moscow
- «Mosenergostroi» company, Moscow

At «ESKoTek» Co.:
50 employees

General Director
Alexander V. KOVAL'

■ **Main Lines of Activity**

- Design, assembling, adjustment of heat and hot water supply registration units «turn-key», guaranteed and after-guarantee service
- Mounting, adjustment and repair of energy objects, electrical and thermal power engineering equipment
- Inspection of particular condition of heat-supply and heat-consumption in the region, recommendations development on choice of promising directions of heat-savings, heat-saving project execution
- Energy consulting and audit

■ **Agreements, contracts, projects supported by the state budget**

- Implementation of high energy efficiency zones in 10 central regions of Moscow
- Development of heat-saving complex plan in Domodedovo «Teploset»
- Development of heat-consumption regulation system for central housing complex of Moscow
- Development and implementation of automated system for housing-communal complex resource registration
- Moscow Government decision No 77 from 10.02.04 realization concerning the resource registration
- Development and manufacture of universal heat-water counter for housing and administrative buildings
- Development of monitoring systems with remote access to building engineering systems by means of GSM-modems
- Development and design of the complex for registration and regulations for housing-and-communal objects
- Energy inspection of «NIlgaseconomika» company
- Energy inspection of Moscow experimental plant for wood shipboard and details at Chimki
- Works on heat-consumption normalization for «Teploset» of Klimovsk

■ **Key publications**

- *Vasina E.M., Gasho E.G.* Experience of combined resource registration in communal complex of Moscow center // Energoberezhenie. 2006. No 2.
- *Vasina E.M., Gasho E.G., Shuvalov S.Yu.* From monitoring system realization to reduction of resource consumption in communal complex // Energoberezhenie. 2006. No 5. P. 7–9.

■ **Partners**

- Prefectures of Central and South-East Administrative Districts of Moscow
- «Independent experts of housing-communal complex of Moscow region» company

- Regional energy commission of Moscow
- Fuel-energy committee of Moscow region
- «Mosregiomenergo» company
- Inter-regional association «Energoeffektivnost i normirovanie»

At «TSIKL PLUS» Co.:
11 employeesGeneral Director, Scientific supervisor
Doctor of technical sciences,
associated-professor
Vadim N. OSTRIROV

■ **Main Lines of Activity**

- Development of electronic converter family for electric drives and power sources on the modern element base
- Development and investigations of regulated asynchronous, gated and gated-inductor electric drives
- Experimental development, manufacture, guarantee and after-guarantee service of electronic converters for regulated asynchronous, gated and gated-inductor electric drives of different purposes

■ **Agreements, contracts, projects supported by the state budget**

- About 60 contract on development, experimental development, manufacture and delivery including for transport facilities, special systems, an on export of tens types of converters for regulated electric drives of various types and also for power supply sources of rolling-stock

■ **Unique equipment**

- Automatic regulators for dosing pumps ARDN-3
- Electronic converters for five-, six-phase gated-inductor electric drives up to 32,5 kW power
- Energy saving complete equipment for the hot water supply pumps and for waste waters exhaustion pumps up to 400 kW power
- Regulated electric drive which has no analogues in the world up to 630 kW in power on the basis of gated-inductor motor with independent excitation
- Secondary supply sources from the contact net 6 and 10 kW in power for modern subway cars

At «Intron Plus» Co.:
31 employees, among them
1 Dr. Sci. (Techn.),
4 Ph.D. (Techn.),
2 Ph.D. students,
24 engineers.

President Winner of RF State Award,
professor Vasily V. SUKHORUKOV

■ Main Lines of Activity

- Development of magnetic and electromagnetic methods and facilities on non-destructive control of steel ropes, pipe-lines, rubber-rope conveyer belts, steel reservoirs and other potentially dangerous industrial objects
- Development of vortex-current thickness-meters for galvanic coverings on dielectrics
- Development of technical diagnostic systems for main pipe-lines on the basis of defect identification algorithms
- Agreements, contracts, projects supported by the state budget
- Development, manufacture and delivery of magnetic defectoscopes for nondestructive control of steel ropes and metal-cord conveyer belts
- Services on inspection and technical condition determination of steel ropes, conveyer belts, steel reservoirs for mining-extractive, oil and other branches of industry

■ Key publications

- *Sukhorukov V.* Steel-cord Conveyer Belt NDT // Proc. of the 8-th Intern. Conf. of the Slovenian Society for NDT, Portoroz, Slovenia, September 1—3, 2005. P. 237—244.
- *P'yannikov V.P., Khomenko S.V., Zhirnov A.V., Shpakov I.I.* Experience of defectoscopy application for rubber-rope conveyer belts // Labor safety in industry. 2005. No 2. P. 28—31.
- *Mironenko A., Sukhorukov V.* Non-Destructive Testing of Mining Ropes: Technical and Economical Aspects // OIPEEC Technical Meeting. Athens, Greece – March 2006. P. 80—86.
- *Mironenko A.S., Shpakov I.I.* Nondestructive control of steel ropes for passenger rope-ways // Podiomnye sooruzhenia. Spetsial'naya tekhnika. 2006. No 4. P. 52—54.
- *Documenting* and interpretation of rope defectoscopy results in Russia and in foreign countries / O. Gronau, A. Russold, S.B. Belitskiy etc. // V mire nerazrushayushego kontrolya. 2006. No 2 (32). P. 25—29.
- *Magnetic* In-Line Inspection of Pipelines: Some Problems of Defect Detection, Identification and Measurement / D. Slessarev, V. Sukhorukov, S. Belitskiy et. al. // Proc. of the 9-th European Conf. on NDT. Berlin, September 2006.

■ Partners

- Federal office on technological inspection
- RAO «EEA Rossii», Moscow
- «Federal net company of united energy system», Moscow
- «Noril'sk Nikel'» compant, Noril'sk
- «Severstal'» company, Cherepovets

-
- ❑ «Madnitogorskiy metallurgicheskiy kombinat» company, Magnitogorsk
 - ❑ «Uralkaliy» company, Berezniki
 - ❑ «Vorkutaugol» company, Vorkuta
 - ❑ «Kuzbassugol» company, Novokuznetsk
 - ❑ «Apatit» company, Kirovsk
 - ❑ «Sevuralboksitruda» company, Severoural'sk
 - ❑ «Krasnoyarskugol» company, Krasnoyarsk
 - ❑ «Raketno-kosmicheskiy kompleks Energia» company, Koroliov, Moscow region
 - ❑ RS-Pribor, Izhevsk
 - ❑ FGUP «Taifun», Kaluga
 - ❑ PS-Elektro, Novosibirsk
 - ❑ «Belgorkhimprojekt» company, Minsk, Belarus Doskoy GOK, Khromtau, Kazakhstan Kaztsink, Ust-Kamenogorsk, Kazakhstan
 - ❑ Ispat Karmet, Karaganda, Kazakhstan
 - ❑ Sukhaya Balka, Krivoy Rog, Ukraine
 - ❑ Zaporozh'e zhelezorudny kombinat, Zaporozh'e, Ukraine
 - ❑ China Steel Corporation, Taiwan, China
 - ❑ Deutsche Montan Technologie GmbH, Bochum, Germany
 - ❑ Plextech Technologies PVT. Ltd., Mumbai, India IIS NDT Allied Services Pvt. Ltd., Mumbai, India Tokyo Rope Mfg.Co., Ltd., Tokyo, Japan
 - ❑ Klaipeda stevedoring company, Klaipeda, Lithuania
 - ❑ CITS Services, Bahor, Malaysia
 - ❑ Heerema Marine Contractors BV, Leiden, Netherlands
 - ❑ Syncrolift, Inc., USA
 - ❑ JPRB «Kolubara», Serbia and Montenegro Singapore Marine Technologies, Singapore Eastco Limited, Hong Kong
 - ❑ AT2CI, France
 - ❑ CARITEC, France
 - ❑ Earth Products Limited, Hong Kong
 - ❑ Technical marketing GKS AB, Sweden

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General Director,

Doctor of technical sciences,

Professor Nikolay D. ROGALEV

■ **Main Lines of Activity**

- **Scientific-organizational, methodic and technical bases of Russian-Chinese innovation co-operation infra-structure development**

Professor Rogalev N.D.

■ **Agreements, contracts, projects supported by the state budget**

- Scientific-organizational, methodic and technical provision for realization of development project for base infra-structure object of Russian-Chinese innovation co-operation
- Development of scientific-organizational and methodic basis of estimation, mechanisms and procedures of permanent efficiency monitoring of Russian-Chinese scientific-technological and innovational co-operation
- Development of technical system of international information exchange, providing of its integration with hardware-software complex Information-marketing system RCT, recommendation issuing on its exploitation and further development

■ **Partners**

- Association «Russian House of international scientific-technological co-operation», Moscow
- Association «Technopark», Moscow
- Assistance foundation for small enterprises in scientific-technological sphere, Moscow
- FGU NII RINKTSE, Moscow
- FGUP «KBOR», Moscow
- «ESKoTEK» company, Moscow
- «BADA» corp. Of Harbin Polytechnic Institute, China
- Center of Russian-Chinese scientific-technological co-operation and industrial transformation, Heilongjiang
- Chinese-Russian base of industrial mastering of new and high technologies, Yantai, China
- Harbin Institute of electronic computing engineering, China
- East-China R&D Institute of electronic engineering, prov. Ankhoy, China

■ **Unique equipment**

- Software-technical complex «International video conference system»

At «Energocontrol» Co.:
20 employees, among them
2 Ph.D. (Techn.),
1 Ph.D. student,
15 engineers.

General Director Ph. B. (Techn.),
Associated-Professor Igor S. PONOMARENKO

■ Main Lines of Activity

- Development of software complexes on automation of electrical nets control systems
- Development and manufacture of measuring instruments for electrical energy quality indexes analysis, electronic components of for automatic accounting system of quality and quantiti power
- Development and manufacture DC system components for electric stations and sub-stations
- Development and manufacture of powerful voltage regulators, voltage regulators for electrical lighting systems
- Production and services
- Software complex for exploitation control automation of distributive electrical nets
- Series of handheld and stationery instruments of electric energy quality indexes analysis intended for electrical energy quality indexes registration in 3-phase (3-, 4 and 5-wires) nets of general purpose
- Handheld gas-analyzer for exhausted fuel gases for technological and ecological control for fuel burning
- Universal charging-recharging aggregate intended for fast and equalizing charging, for supporting recharging of leak-proof and air-proof rechargeable batteries for DC supply nets of relay protection systems for electric stations and sub-stations
- Handheld tools for DC system rechargeable battery condition diagnostic, tools for these system insulation condition control
- Power regulators of high power voltage, voltage regulators for electric lighting systems
- Service on inspection and analysis of electric energy quality indexes in electric supply systems of industrial enterprises, towns and agriculture

■ Key publications

- *Ponomarenko I.S.* Handheld gas-analyzer «Topogas-01» for boiler installation operation control // *Energonadzor и energobezopasnost.* 2005. No 2. P. 55—57.
- *Ponomarenko I.S. Sumin A.G.* Universal charging-recharging aggregate IPT-MEI.80. // *Elektro-Info.* 2005. No 11. P. 56.
- *Ponomarenko I.S., Skorniakov A.Yu.* Post-fault operation analysis and their control in distribution electric nets // *Elektrichestvo.* 2006. No 1. P. 27—32.

■ Partners

- Electric energy systems
- Electric nets
- Industrial and commercial organizations

- Housing-communal objects
- Standardization centers
- Testing laboratories
- More than 500 consumers from Russia, Ukrain, Kazakhstan, Uzbekistan

■ **Unique equipment**

- Testing equipment for checking the permissible emission values of current harmonic components and voltage variations by technical facilities
- High-precision generator of calibrated signals (calibrator) for development, certification and verification of measuring and quality analysis tools and electronic counters

HIGH TECHNOLOGY CENTER AND LOW TEMPERATURE DEPARTMENT

HIGH TECHNOLOGY CENTER AND LOW TEMPERATURE DEPARTMENT (HTCLT)

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Evgeniy V. AMETISTOV
Director of HTC, head of LT department
Doctor of technical sciences, professor,
Winner of State RF Award
and RF Government Award Alexander S. DMITRIEV

■ Main Lines of Research

Research Supervisor

- **Development of conception, structure and information-analytic system for the technological transfer channel**
Professors Ametistov E.V., Dmitriev A.S.
- **Development of radiation tiny space heat-exchangers**
Professor Dmitriev A.C., leading researcher Bukharov A.V.
- **Nano-technologies: nano-electronics and nano-energetic**
Professors Aleksenko A.G., Dmitriev A.S.
- **Development of cryogenic corpuscular mono-disperse targets for accelerating technology and nuclear fusion**
Professor Dmitriev A.C., leading researcher Bukharov A.V.
- **Research and developments in area of high-speed printer heads**
Professor Dmitriev A.C., associated-professor Ginevskiy A.F.
- **Research of heat exchange and cryogenic liquid flow hydrodynamic in channels**
Professor Klimenko A.V., senior researcher Sudarchikov A.M.
- **Investigation of gas- and vapour-dust mixtures in non-equilibrium conditions**
Professor Kryukov A.P.
- **Studying of non-equilibrium transfer processes on inter-phase surface gas-condensate including micro- and nano-structures**
Professor Kryukov A.P.
- **High technologies in vacuum engineering and nano-technologies**
Professor Nesterov S.B.
- **Investigations of mixture thermal-dynamical properties and low-temperature vapor-liquid cycles at operation on mixtures**
Associated-Professors Lunin A.I., Mogorychny V.I.
- **Investigations of capillary instabilities of drops and streams in non-equilibrium conditions**
Associated-professor Ginevskiy A.F.
- **Thermal-dynamic analysis and low-temperature installation development**
Professor Brodyanskiy V.M.
- **Development of technology for monodisperse micro-spheres production from rare-earth metals and alloys**
Leading researcher Ankudinov V.B.

■ Agreements, contracts, projects supported by the state budget

- Investigations of thermal-dynamical properties of cryogenic mixtures
- Studying of stream desintegration in non-equilibrium conditions
- Investigations of drop flows hydrodynamics and heat-exchange in vacuum
- Technology of monodisperse micro-spheres from rare-earth metals and alloys
- Research and development in area of nano-emission electronics: nano-emitter for creation of ultra-bright energy saving displays
- Development of new materials on the basis of poly-crystal diamond films
- Studying of non-equilibrium transfer processes on inter-phase surface gas-condensate

■ Key publications

- *Cryogenic* corpuscular targets (hydrogen granule generation, constructive elements calculations, experimental setup, tests) / V.N. Afonasyev, V. Borgs, A.V. Bukharov etc. // Preprint No 9-05. 2005. ITEF.
- *Ametistov E.V., Dmitriev A.S.* High technologies Center of Moscow Power Engineering Institute – transfer technological channel // MPEI Vestnik. 2005. No 5. P. 5–7.
- *Dmitriev A.S., Timokhov N.V.* Analysis of heat transfer models in nano-wires // Proc. of XI Intern. conf. of students “Radio Electronics, electrical engineering and power engineering. In 3 vol. MPEI, 2005. V. 3. P. 75–76.
- *About* the choice of optimal refrigerating method of flat surface / A.F. Ginevskiy, A.S. Dmitriev, A.I. Lunin, L.V. Shpikalov // Ibid. P. 168–169.
- *Ankudinov V.B., Klionov M.G.* Experimental research of convection heat emission in ordered flow of monodisperse drops // Teplofizika vysokikh temperatur. 2005. V. 43. No 4. P. 625–630.
- *Sudarchikov A.M.* Hydrodynamic instability of forced nitrogen boiling in the channel // MPEI Vestnik. 2005. No 4. P. 33–39.
- *Klimenko A.V., Sudarchikov A.M., Klimenko V.V.* Experimental investigation of boiling crisis of forced nitrogen flow in the channel at high pressure // MPEI Vestnik. 2005. No 6. P. 135–139.
- *Kriukov A.P., Levashov V.Yu., Shishkova I.N.* Overcondensation at presence of non-condensed component // Inzhenerno-fisicheskii zhurnal. 2005. V. 78. No 4. P. 15–21.
- *The Moscow-Juelich Pellet Target* / A. Bucharov, M. Buesher et. al. // Hardon 05. XI Intern. Conf. on Hardon Spectroscopy. Rio de Janeiro, Brazil, August 21–26. 2005. P. 78–84.
- *Strogova T.S., Nesterov S.B., Vasiliev Yu.K.* Research of diluted gas characteristics in various current modes // Nauchnaya sessiya MIFI-2005: paper collection. 2005. V. 8. P. 19–20.
- *Bacteria* photo-inactivation by monochromatic blue light / E.V. Ametistov, A.S. Dmitriev, V.S. Zrodnikov etc. // Almanakh klinicheskoy meditsiny. 2006. V. XII. P. 6.
- *Experimental* setup for producing the hydrogen hard granules / A.V. Bukharov, M. Buser, A.S. Gerasimov etc. // MPEI Vestnik. 2006. No 2. P. 16–24.
- *Experiments* on liquid hydrogen granule producing / A.V. Bukharov, M. Buser, A.S. Gerasimov etc. // MPEI Vestnik. 2006. No 3. P. 34–40.
- *Dmitriev A.S., Timokhov N.V.* About of phonon heat conductivity calculation of dielectric and semiconductor nano-wires at relaxation time approximation // MPEI Vestnik. 2006. No 6. P. 125–133.
- *Dmitriev A.S.* Fundamentals of cryophysics of condensed systems. MPEI Publishing House, 2006.

- *Kryukov A.P., Levashov V.Yu., Shishkova I.N., Yastrebov A.K.* Kinetic Boltzmann equation and approaches to its solution for the engineering practice. MPEI Publishing House, 2005. 80 p.
- *Kryukov A.P., Levashov V.Yu., Shishkova I.N.* Vapor-gas mixture streams in micro- and nano-systems at evaporation-condensation presence // Proc. of IV Russian conf. on heat-exchange. . MPEI Publishing House, 2006. V. 1. P. 164—167.
- *Kryukov A.P., Selianinova Yu.Yu.* Inter-phase surface form at water film boiling on half-sphere // Ibid. V. 4. P. 155—158.
- *Kryukov A.P., Yastrebov A.K.* Liquid heating influence on heat-and-mass transfer in vapor film for essentially non-equilibrium conditions // Ibid. V. 5. P. 134—137.
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- *Kryukov A.P., Mednikov A.F.* Experimental research of He-II boiling on sphere // Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki. 2006. V. 47. No 6.
- *Koroliyov P.V., Kryukov A.P., Mednikov A.F.* Experimental research of He II motion in capillary at presence of vapor cavity near the heater // MPEI Vestnik. 2006. No 4. P. 27—33.
- *Shishkova I.N., Sazhin S.S.* A Numerical Algorithm for Kinetic Modeling of Evaporation Processes // Journal of Computational Physics. 2006 (in press).
- *Kryukov A.P., Yastrebov A.K.* The Solving of the Boltzmann Equation in Some Problems With Moving Interface Surface // 25-th Intern. Symp. on Rarefied Gas Dynamics. S-Petersburg, Russia. Book of Abstracts. 2006. P. 60.
- *Kryukov A.P., Levashov V.Yu., Shishkova I.N.* Evaporation-Condensation Problem in Vapor-Gas Mixtures // Ibid. P. 180.
- *Kortsenstein H.M., Samuilov E.V., Yastrebov A.K.* On possibility of volume condensation process modeling for supersaturate vapor by method of of direct numerical solution of the main kinetic equation // DAN RAS. 2006. V. 408. No 5. P. 631—635.

■ Patents

- *Patent 50119 RF.* Safety device / E.V. Ametistov, A.S. Dmitriev, V.N. Nikolaev etc. 2005.
- *Patent 50118 RF.* External fastening unit of safety device / E.V. Ametistov, A.S. Dmitriev, V.N. Nikolaev etc. 2005.

■ Dissertations

- *Biglari M.* Research of transfer processes in vapor films resulting at interaction of heated bodies with cryogenic liquids: Cand. Sci. (Techn.) Dissertation. 2005.
- *Ter-Arutiunov B.G.* Investigation of vacuum ion-plasma covering physical-chemical properties influence on the constructive material wear-resistance increase: Cand. Sci. (Techn.) Dissertation. 2005.
- *Selianinova Yu.Yu.* Transfer process peculiarity on inter-phase surfaces vapor-liquid: Cand. Sci. (Techn.) Dissertation. 2005.
- *Vasilieva T.S.* Gas streams in geometrically complex cryo-vacuum systems: Cand. Sci. (Techn.) Dissertation. 2006.
- *Sabirzianov N.R.* Development and calculation of cryo-vacuum support of nano-technological installations: Cand. Sci. (Techn.) Dissertation. 2006.

■ Partners

- Association «Kholodbytmarsh», Moscow
- «Geliymash» company, Moscow
- «Kriogenmash» company, Moscow
- «Nauka-Servic-Tsentr» company, Moscow
- FGUP «Keldysh R&D center», Moscow
- FGUP «Institute of theoretical and experimental physics», Moscow
- Institute of general physics of RAS, Moscow
- Russian scientific center «Kurchatov Institute», Moscow
- Dresden technical university, Germany
- «Edvard product department cryogenics Inc.», USA
- «IPD cryogenics Inc.», USA
- «Cryomach Inc.», USA
- «Samsung Electronics» company, Republic of Korea
- «Sumitomo» company, Japan
- «Daikin» company, Japan
- Russian-Chinese technological park
- Research nuclear center Ulich, Germany

■ Unique equipment

- Cryo-center
- Thermal chamber for refrigerating equipment testing
- Setup for helium isotop film behavior studying
- Setup for superfluid helium research
- Setup for studying of streams and drops of various liquid in vacuum
- Setup for research and production of metal monodisperse micro-spheres
- Setup on ultra-fast freezing
- Nano-technological equipment