

# Contents

## PHYSICS AND MATHEMATICS

- V. N. Zadorozhnyi. Channels distribution in nonmarkovian queueing networks. 5  
V. K. Fedorov. The theoretical solution of the problem of heat localization at formation of nonequilibrium dissipative structures and the hypothesis of generality of origin and uniformity of interior structure of Solar System planets and the planets of other star systems. 11

## ENGINEERING GEOMETRY AND COMPUTER GRAPHICS

- S. V. Pavlova. On the geometric design of products with complex surface shape. 17

## MECHANICAL ENGINEERING

- P. D. Balakin, A. M. Kropachev. Calculation of mechanical efficiency of wave type motion transformer. 20  
E. V. Artyamonov, S. S. Chujkov. The metal-cutting tool with preliminary heating of replaceable hard-alloy plates. 24  
E. N. Eremin, G. N. Minnekhanov, Yu. O. Filippov, R. G. Minnekhanov, M. V. Trenikhin. Study of properties of ultradisperse powder of titanium carbonitride obtained by plasma chemical synthesis. 27  
B. N. Stikhanovsky, V. R. Edigarov, V. V. Malyi. Analysis of the rotational and shock actuator with the recuperator of kinetic energy. 31  
D. I. Chernyavsky, D. D. Chernyavskaya. Application of shock process for nanotechnologies. 38  
K. Yu. Melnikov, S. D. Ugryumova. Analysis of velocity change of cargo motion at inclined vibrating surface. 41  
I. V. Fedorov. Application of discrete wavelet transformation for rotary machines diagnostics. 44  
S. A. Korneyev, I. V. Krupnikov, S. N. Polyakov, V. V. Schalay. Numerical estimation of bearing ability pipelines with corrosion defects. 48  
M. I. Chigrin, V. E. Scherba. Analysis of process of sedimentation of the sandy pulp in the pressure heard pipeline. 51  
M. I. Chigrin. The increase of efficiency of new way of the hydraulicking of sand. 54  
M. I. Chigrin. About character of movement of the deformed particles in the stream of pulp at sand hydraulicking. 58  
A. B. Korchagin, G. S. Averyanov, V. E. Konovalov, R. N. Khamitov. Hydrodynamic vibroimpact stand with two-cascade control system. 63  
V. V. Salay, Yu. P. Mokushov. Calculating characteristics of injected fluid oxidizer. 66  
A. B. Yakovlev. Formulation of the dynamics equation of the liquid rocket engine. 71  
A. S. Noskov, A. V. Lovtsov, A. V. Hail. Mathematical study of gas stream structure in swirling device of vortex tube. 74  
V. F. Egorov. Dynamic modes of electromechanical systems of cyclic operation. 77  
V. F. Egorov, S. V. Egorov. Dynamic modes of multiengine electromechanical systems. 80  
V. L. Yusha, G. I. Chernov. The ideal thermodynamics cycle of internal combustion engine with additional heating of cooling systems water. 84  
A. G. Mikhailov. Theory of combustion of gaseous and liquid fuels. 88  
A. S. Nenishev, A. V. Glazyrin. New circulation scheme of boiler KW-GM-3,65 with diametric moved membranes. 90  
S. A. Makeev, N. A. Grishaev. Numerical modeling local stability elements of trapezoid section. 93  
L. N. Kiselyova. To the question of chips parameter calculation made by cutting tool of digging machine. 97  
V. N. Kuznetsova, E. S. Avdeeva. Trends for increasing of wear resistance of excavator buckets teeth. 99  
Yu. I. Matyush, A. P. Semenov. Theoretical and experimental analysis of outflow of polydisperse medium consisting of air and granulated carbon dioxide. 101  
I. N. Akhtulova, O. V. Dezhurova. The algorithm of forecasting of discrepancies in the model of improvement of quality of serial processes of manufacture. 105

## ELECTRICAL AND POWER ENGINEERING

- E. G. Andreeva, A. A. Tatevosyan, I. A. Semina. The analysis of axial symmetry models of magnetic system of open type. 110  
A. V. Ded, V. N. Goryunov, S. S. Girshin, A. A. Bybenchikov, A. S. Petrov, E. V. Petrova, V. V. Tevs. The increase of accuracy of electric energy losses assessment according to the regime and climatic factors. 114  
A. A. Virva, V. N. Goryunov, S. S. Girshin, A. A. Bybenchikov, A. S. Petrov, E. V. Petrova, V. V. Tevs. The formulae for wire temperature analysis for calculation of electric energy losses problems. 120  
V. A. Burcheskiy, V. N. Goryunov, S. S. Girshin, A. A. Bybenchikov, A. S. Petrov, E. V. Petrova, D. G. Safonov. Correction of technological electric energy losses in air-lines 35 kV of the electrical power networks of JSC «Rosneft-Yuganskneftegaz» taking into account climatic and operating conditions. 127  
A. G. Lyutarevich, S. Yu. Dolinger. Assessment of efficiency of active harmonic filter in power supply systems for improvement of electrical power quality. 133  
S. Yu. Dolinger, A. G. Lyutarevich. Application wavelet-analysis for definition of indicators of electrical power quality. 136  
D. G. Safonov, K. K. Turakhanov. Using probabilistic and statistical methods for evaluation of parameters of electrical power quality. 140  
D. G. Safonov, K. K. Turakhanov. The analysis of the basic characteristics of modern means of measurement of power quality parameters. 144  
S. N. Chizhma, V. S. Tsirkin. Signal control in the electric networks using wavelet transformation analysis. 149  
S. N. Chizhma, I. Yu. Matsko. Control of six and twelve-pulse three-phase rectifier by spectral-temporal analysis. 153  
N. G. Ananieva. Reduction of specific energy consumption for traction in trains by introducing situation control system at railroad crossing. 158  
R. I. Gazizov. Evaluation of voltage signal fundamental harmonic frequency in railroad power supply systems. 161

## INSTRUMENT ENGINEERING, METROLOGY AND INFORMATION-MEASURING EQUIPMENT AND SYSTEMS

- V. A. Zakharenko, A. G. Shkayev. Technology of stabilization of parameters of optical electronics equipment. 164  
S. S. Grizutenko, E. A. Dumnova. Selection of components for OFDMA mode. 167

## INFORMATION TECHNOLOGIES

- V. N. Zadorozhnyi. Methods of calibration of stochastic additive graph generators. 171  
E. D. Bychkov. The model of control of channel resource of queueing systems on the basis of fuzzy rules for output. 177  
E. D. Bychkov, A. S. Kiyav. The algorithm of routing of data packets in the distributed control system on the basis of fuzzy preference matrixes. 182  
V. P. Sizikov. To imitative modeling on the DIS-technology base. 186  
E. B. Yudin. Modeling stability of the Internet under condition of viruses propagation and random failures of network elements. 190  
E. E. Shmulenkova. The use of animation elements for graphic constructions checking system in «Self-education» mode. 195  
E. V. Leonova, A. B. Korobova. The use of apparatus of discrete optimization for teenagers' clothing computer-aided design considering psycho-physiologic comfort. 198

## RADIO ENGINEERING AND COMMUNICATION

- E. I. Algazin, A. P. Kovalevsky, V. B. Malinkin. Invariant system with non-linear processing of signals and weak correlation. 202  
V. S. Budyak. Criteria for evaluation and results of experimental research on EMC of combined short-wave radio relay centers. 206  
I. D. Zolotarev, V. A. Berezovskiy. The method for increasing sensitivity of short-wave signal detector. 210  
V. J. Kobenko. The fractal identification plane of Vz-method. 213

- S. N. Litunov, M. A. Svetus. Study of electrically conductive properties of carbon black. 224  
 S. N. Litunov, A. V. Titov. On modeling of paint flow in color feeding unit of offset printing machines. 228

## IMPLEMENTATION OF INFORMATION TECHNOLOGIES IN THE PROCESS OF EDUCATION

- O. V. Batenkina, S. P. Shamets. Introduction of information technologies into educational process. 233  
 G. N. Moshinova. Up-to-date approaches of information technology application in educational process. 236  
 N. V. Savinova. Introduction of engineering analysis courses to in special disciplines. 241  
 V. A. Glotov, V. U. Ignatugin. Computer technologies application for teaching of technical subjects. 244  
 T. G. Kostyuchenko. Information technologies used for training instrument engineering specialists in Tomsk polytechnical university. 248  
 A. V. Maltseva. The usage of CAD/CAE-systems in research work of students. 250

## Summary

## PHYSICS AND MATHEMATICS

**V. N. Zadorozhnyi**  
**Channels distribution in nonmarkovian queueing networks**

New effective analytical-simulation method of structured optimization of nonmarkovian queueing networks is offered.

Keywords: a network with queues, simulation, optimization.

**V. K. Fedorov**  
**The theoretical solution of the problem of heat localization at formation of nonequilibrium dissipative structures and the hypothesis of generality of origin and uniformity of interior structure of Solar System planets and the planets of other star systems**

Simple mathematical models contain the composite spectrum of nonequilibrium dissipative structures. It is shown, that on the allocated class of unclosed and nonlinear mediums that the composite nonequilibrium dissipative structures may arise and meta stably supported in restricted space. The analysis of the fundamental existential relations aimed at search of the physical phenomena and legitimacies, implemented in macro- and megascopic scales is carried out.

Keywords: chaos, discreteness, a continuity, nonlinearity, a perfect vacuum, a diffusion, nonequilibrium dissipative structures, plasm-gas medium, fire-fluid medium.

## ENGINEERING GEOMETRY AND COMPUTER GRAPHICS

**S. V. Pavlova**  
**On the geometric design of products with complex surface shape**

The article discusses some theoretical aspects of the challenges of designing unwrapping surfaces of complex shapes by specifying the auxiliary developable surface.

Keywords: surface, sweep, geometric modeling, the geodesic curve

## MECHANICAL ENGINEERING

**P. D. Balakin, A. M. Kropachev**  
**Calculation of mechanical efficiency of wave type motion transformer**

Calculation of mechanical efficiency of wave type motion transformer in which sliding motion of active surfaces is replaced by rolling motion that makes the design to be perspective and competitive.

Keywords: transfer, the converter, intermediate bodies, качение, efficiency, sliding motion.

**E. V. Artamonov, S. S. Chujkov**  
**The metal-cutting tool with preliminary heating of replaceable hard-alloy plates**

On the basis of the research done a new design of the metal-cutting tool that provides the increase of working capacity by preliminary heating of replaceable hard-alloy plate of the modular tool is made.

Keywords: working capacity, the tool, preliminary heating, temperature, cutting.

**E. N. Eremin, G. N. Minnekhanov, Yu. O. Filippov, R. G. Minnekhanov, M. V. Trenikhin**  
**Study of properties of ultradisperse powder of titanium carbonitride obtained by plasma chemical synthesis**

Dispersion, specific surface area, proportion and gas saturation of ultradisperse powder of titanium carbonitride obtained by plasma chemical synthesis

are studied. It is established that industrial production powders are in broad variations in grain size of particles, low volume of particles of nano-sized level and high gas saturation. Preliminary particle activation for inoculation of melts before their application is offered.

Keywords: ultradisperse powder of titanium carbonitride, inoculation of melts, properties, plasma chemical synthesis

**B. N. Stikhanovsky, V. R. Edigarov, V. V. Malyi**  
**Analysis of the rotational and shock actuator with the recuperator of kinetic energy**

The results of analysis of rotational and shock actuator are considered. It accumulates kinetic energy during considerable angular path at acceleration of inertial masses with regulated frequency and energy of impact that it is possible to use in two ways: for creation of devices of civil and defense purpose testing shock and centrifugal loadings simultaneously. It could be applied as a shock impulse device in punchers, boring machines, mechanized hammers etc. The process of accumulation of kinetic energy is studied. The mathematical apparatus and software for calculation of head speed and its kinetic energy is developed. Optimization of constructive elements of the actuator is done.

Keywords: rotational and shock actuator, kinetic energy, recuperator, shock impulse, instrument-wave guide.

**D. I. Chernyavsky, D. D. Chernyavskaya**  
**Application of shock process for nanotechnologies**

On the basis of the research the structural scheme of the press forming significant force in operating zone within punch run in several micrometers is offered. The obtained results are recommended for the use at machine-building and instrument-making enterprises of Omsk and the Siberian federal district for manufacturing of high-precision products by methods of pressing.

Keywords: impact, shock, nanotechnologies, pressing, pressure.

**K. Yu. Melnikov, S. D. Ugryumova**  
**Analysis of velocity change of cargo motion at inclined vibrating surface**

The article deals with the analysis of experimental data obtained on the vibration stand at different factors effecting on the cargo friction ratio. Output of mathematical model of movement depending on water irrigation, vibrating surface incline angle, frequency and vibration amplitude is made.

Keyword: vibration, separation, orientation, friction, irrigation.

**I. V. Fedorov**  
**Application of discrete wavelet transformation for rotary machines diagnostics**

The necessity of vibrodiagnostic quality and reliability improvement is proved. Algorithms of prior signal processing with discrete wavelet transform are offered. These algorithms improve reliability of diagnostics by 3 to 5 percents.

Keywords: vibration, diagnostics, wavelet-transform, spectra, defect, Fourier-transform.

**S. A. Komeyev, I. V. Krupnikov, S. N. Polyakov, V. V. Schalay**  
**Numerical estimation of bearing ability pipelines with corrosion defects**

In the article destruction of pipelines with corrosion defect is simulated. The mathematical model is applied to a steel 19G elastic-plastic deformations of the metals, obtained earlier by the authors. Practical recommendations are given.

Keywords: elastic-plastic deformations, the pipeline with corrosion defect.

**M. I. Chigrin, V. E. Scherba**

**Analysis of process of sedimentation of the sandy pulp in the pressure head pipeline**

In the article motion of sandy pulp along a pressure head pipeline is considered. The process of sedimentation of sand on the bottom part of the pipeline is analyzed at various modes of liquid current and in dependence of the structure of sandy mix. It is shown that in comparison with calculation under real conditions due to the impact of particles of sand and their size actual speed of subsidence is lower than calculated. The increase in turbulence of a stream also reduces speed of lowering of particles of sand.

**Keywords:** Hydroalluvium of sand, sedimentation of sand, speed of lowering

**M. I. Chigrin, V. E. Scherba**

**The increase of efficiency of new way of the hydraulicking of sand**

In the article the designs of thickener used for hydraulicking of sand are considered. It is established, that the most universal and safe is the gravitational densifier. The results of natural experiments have shown its positive prospects. The constructive improvement of gravitational thickener based on the use of centrifugal forces acting on particles of sand is offered. Positive results of natural tests are obtained.

**Keywords:** hydraulicking of sand, densifier, hydro transport

**M. I. Chigrin**

**About character of movement of the deformed particles in the stream of pulp at sand hydraulicking**

In the article the hydraulic pipeline with depleted pulp outlet on the first leg is considered. The influence of the shape of sand particles on the trajectory of their motion and speed of sedimentation is analyzed. Experiments are carried out at sedimentation of round and deformed plastic balls in calm water. It is shown, that the trajectory of motion and speed of sedimentation of particles essentially depends on its shape. It enables to correct results of calculations of pulp motion in a pipeline.

**Keywords:** hydromechanics, flow of bodies, pipeline, hydraulicking of sand

**A. B. Korchagin, G. S. Averyanov, V. E. Konovalov, R. N. Khamitov**  
**Hydrodynamic vibroimpact stand with two-cascade control system**

Hydrodynamic vibroimpact stand with two-cascade control system is offered with the extended functionality. It creates power influences on the tested object changed in a wide frequency range at various forms of power influences including seismic or shock character. Extension of functionality is possible because hydrodynamic vibroimpact stand contains drives with changeable frequency of fluctuation within the range 0 ... 20 Hz, it changes the amplitude of fluctuations within the range from 0 to 120 mm and the device for simulation of impact with amortization system.

**Keywords:** frequency of influences, frequency of fluctuations, amplitude of fluctuations, amortized object, a force impulse.

**V. V. Salay, Yu. P. Makushev**

**Calculating characteristics of injected fluid oxidizer**

The methods of spraying fineness calculation and fluid oxidizer injection path illustrated by examples are presented.

**Keywords:** nozzle, speed, spraying fineness, spray path.

**A. B. Yakovlev**

**Formulation of the dynamics equation of the liquid rocket engine**

In the article the static and dynamic characteristics of the liquid rocket engine with pump system of fuel delivery for the turbine are considered. The system of equations of dynamics describing the processes occurring in the liquid rocket engine on thrust control channel is formulated.

The mathematical model analyses the basic laws of influence of input parameters on the controlled parameters by selection factors to gain desirable kind of transient process.

**Keywords:** liquid rocket engine, static characteristic, dynamic characteristic, draught regulation

**A. S. Noskov, A. V. Lovtsov, A. V. Hait**

**Mathematical study of gas stream structure in swirling device of vortex tube**

In the article mathematical modeling of gas stream in swirling device of the vortex tube is developed. For the purpose of increasing of indicators of the vortex tube a new design of the swirling device is offered.

**Keywords:** vortex tube, twisting device, free vortex.

**V. F. Egorov**

**Dynamic modes of electromechanical systems of cyclic operation**

The basics of optimization of transient processes are shown during start-up and braking regimes if there is no necessity of restriction on engine maximum overload ability under the laws of changing of the start and brake torques close to constant of trapeze shapes for the designers engaged in development of the equipment of the industrial enterprises.

**Keywords:** cyclic mode, transitive process, symmetric mode of speed.

**V. F. Egorov, S. V. Egorov**

**Dynamic modes of multiengine electromechanical systems**

The theoretical rules of alignment of currents and torques of loading of engines in dynamic modes are developed at high and low speed of electromechanical systems with a multiengine actuator with common rigid shaft. The synthesis of the control systems ensuring alignment of currents and the torques of engines in transitive and stable modes of operations is done.

**Keywords:** a multiimpellent drive, dynamic modes, alignment of loadings.

**V. L. Yusha, G. I. Chernov**

**The ideal thermodynamics cycle of internal combustion engine with additional heating of cooling systems water**

In the article the analysis of efficiency of an ideal thermodynamics cycle of an internal combustion engine with vapor and gas working mixture and multistage additional heating of cooling systems water is presented. There theoretical research of engine characteristics dependence by parameters of compressor and engine cooling systems water is conducted.

**Keywords:** thermodynamic cycle, combustion chamber, vapor and gas mixture

**A. G. Mikhailov**

**Theory of combustion of gaseous and liquid fuels**

The article deals with the calculation of furnace boilers using techniques that describe processes in laminar and turbulent reacting jets of gas mixture.

**Keywords:** burner, flame, laminar, turbulent, aeromechanics.

**A. S. Nenishev, A. V. Glazyrin**

**New circulation scheme of boiler KW-GM-3,65 with diametric moved membranes**

It is designed and successfully implemented new steel water heating boilers KW-GO with more than 92 % surface used for heat transfer. The scheme of circulation provides higher speed of water in more heated part of the boiler.

**Keywords:** non symmetrical load, water heating boiler.

**S. A. Makeev, N. A. Grishaev**

**Numerical modeling local stability elements of trapezoid section**

The results of numerical modeling of the influence of geometrical radius arch structure on local stability elements of trapezoid section are presented.

**Keywords:** arch structure, trapezoid section, numerical modeling, method of final elements, loss of local stability.

**L. N. Kiselyova**

**To the question of chips parameter calculation made by cutting tool of digging machine**

The article presents some new opportunities of digging machine that influence efficiency of the digging process.

**Keywords:** soil, operating organs, digging machine

**V. N. Kuznetsova, E. S. Avdeeva**

**Trends for increasing of wear resistance of excavator buckets teeth**

The article presents a process of interaction of operating elements with soil and deals with increases of overall performance of digging machines. The analysis of wear process of operating elements of a power shovel is carried out.

**Keywords:** working organs, soil, power shovel.

**Yu. I. Matyash, A. P. Semenov**

**Theoretical and experimental analysis of outflow of polydisperse medium consisting of air and granulated carbon dioxide**

There is a problem of air duct contamination in railway carriages pollution that is analyzed in this article. The results of sanitary-and-hygienic inspection of passenger railway carriages in 2006 are presented. So, there is a problem of air duct cleaning due to lacks in air duct cleaning technologies. The basic physical and chemical properties granulated carbon dioxide are described. The prospects of cleaning technology development are presented.



Keyword: granulated carbon dioxide, experimental researches, air duct, carriage, polydisperse current, technique, pressure air, sanitary-and-hygienic diagnostic, gas, dust, pollution, refitting of clearing.

**L. N. Akhtulova, O. V. Dezhurova**

**The algorithm of forecasting of discrepancies in the model of improvement of quality of serial processes of manufacture**

In the article the decision-making model for treatment of discrepancies in serial processes is considered. It is based on complex use of statistical methods and methods of expert estimations for information processing.

Keywords: safety, quality, expert methods, discrepancies of management.

## ELECTRICAL AND POWER ENGINEERING

**E. G. Andreeva, A. A. Tatevosyan, I. A. Semina**

**The analysis of axial symmetry models of magnetic system of open type**

In the article the analysis of magnetic system of open type having axial symmetry is carried out. The physical and mathematical axial symmetry model of the system is developed and the results of experiment and numerical calculation in a complex programs are obtained.

Keywords: magnetic system of open type, method of final elements, complex of programs.

**A. V. Ded, V. N. Goryunov, S. S. Girshin, A. A. Bybenchikov, A. S. Petrov, E. V. Petrova, V. V. Tevs**

**The increase of accuracy of electric energy losses assessment according to the regime and climatic factors**

In the article electric energy losses assessment techniques of high accuracy are considered. The analysis of heat transfer emission is presented. The electrical wire temperature dependent from the current is formulated and the influence of the formulas on the active resistance and electric energy losses is estimated. The temperature operating modes analysis of the various conductor diameter is presented. Electric energy losses comparison is made at the wire temperature 20°C and at the wire actual temperature (taking into account a current, wind, ambient air temperature).

Keywords: accuracy increase, electric power losses, wire temperature, environmental conditions.

**A. A. Virva, V. N. Goryunov, S. S. Girshin, A. A. Bybenchikov, A. S. Petrov, E. V. Petrova, V. V. Tevs**

**The formulae for wire temperature analysis for calculation of electric energy losses problems**

The temperature balance formula of a wire at different values of currents are considered. The mathematical model for wire temperature calculation is specified taking into account climatic and regime factors. Acceptable limits of current values for various kinds of uninsulated wires are specified.

Keywords: wire temperature, approximation, environmental conditions, mathematical model.

**V. A. Burchevskiy, V. N. Goryunov, S. S. Girshin, A. A. Bybenchikov, A. S. Petrov, E. V. Petrova, D. G. Safonov**

**Correction of technological electric energy losses in air-lines 35kV of the electrical power networks of JSC «Rosneft-Yuganskneftegaz» taking into account climatic and operating conditions**

In the article the comparison of electrical power losses at wire temperature + 20 °C with electric power losses at actual temperature of a wire (taking into account current, wind and ambient air temperature) is done by the example of the electrical power air-lines of JSC «Rosneft-Yuganskneftegaz». The analysis is carried out taking into account annual ambient air temperature. The account of ambient air temperature for areas with low and middle annual temperature which can lead to decreasing in value of the tariff for the electric power by is proved.

Keywords: specification of calculation, electric power loss, environmental conditions, air-lines.

**A. G. Lyutarevich, S. Yu. Dolinger**

**Assessment of efficiency of active harmonic filter in power supply systems for improvement of electrical power quality**

The article is devoted to estimation of the efficiency of devices damping high harmonics level in load junction of electrical supply systems. In the conclusion the criterion of use of an active power filter is obtained as a result of calculation of cost recovery of active and passive filters depending on the factor of voltage harmonics and parts of 5th, 7th, 11th and 13th harmonics from THD.

Keywords: power filters harmonics, efficiency of use of filters harmonics.

**S. Yu. Dolinger, A. G. Lyutarevich**

**Application wavelet-analysis for definition of indicators of electrical power quality**

This article is devoted to the problem of electrical power quality control which as well as any goods should meet certain requirements. Application of the wavelet-analysis for definition of power quality parameters will allow creating devices capable continuously to trace power quality. Application of wavelet-analysis for definition of power quality parameters will give opportunity to design new devices. In the article theoretical bases of wavelet analysis for the non-stationary signals are obtained.

Keywords: electric power quality, wavelet-analysis, wavelet, Fourier, measurement power quality parameters.

**D. G. Safonov, K. K. Turakhanov**

**Using probabilistic and statistical methods for evaluation of parameters of electrical power quality**

The article is devoted to the analysis of power quality in the electrical supply system. Power quality control implies the assessment of performance to established standards, and further analysis of power quality - determination of the causes of the deterioration of these parameters.

The change of the parameters of electrical networks, power and nature of the load over time are the main cause of changes in parameters of power quality. Thus, parameters of power quality - steady-state voltage deviation, the coefficients that characterize non-sinusoidal voltages and asymmetry, frequency deviation, the magnitude of voltage variation, etc. - random quantities and their measurement and treatment should be based on probabilistic and statistical methods.

Keywords: parameters of power quality, variance, median, Pearson criterion.

**D. G. Safonov, K. K. Turakhanov**

**The analysis of the basic characteristics of modern means of measurement of power quality parameters**

The article is devoted to the problems of measurement means evaluation and the analysis of power quality in electrical networks. In the article modern means of measurement of power quality parameters are considered. Also the attention to the requirements shown by standard documents on measurements of power quality is paid. In the conclusion the comparison of characteristics of domestic and foreign means of measurement of power quality parameters are resulted.

Keywords: power quality, power quality parameters, means power quality parameters.

**S. N. Chizhma, V. S. Tsirkin**

**Signal control in the electric networks using wavelet transformation analysis**

This paper is about analysis of nonstationary electrical signals. Basic power quality disturbances are shown. The discrete wavelet transformation has been used to detect and analyze power quality disturbances.

Keywords: wavelet, discrete wavelet transform, power quality disturbance.

**S. N. Chizhma, I. Yu. Matsko**

**Control of six and twelve-pulse three-phase rectifier by spectral-temporal analysis**

The paper describes the use of spectral-temporal analysis for the diagnostics of electric power systems of railways DC.

Keywords: spectral-temporal analysis, control of the DC power supply systems, three-phase rectifier.

**N. G. Ananieva**

**Reduction of specific energy consumption for traction in trains by introducing situation control system at railroad crossing**

The article is dealt with railway crossing automated control system based onto video surveillance of the crossing area. The proposed system allows controlling train speed at the crossing area that leads to specific consumption reduction on train traction. To estimate power consumption of rolling-stock in different speed ranges simulation of one intersubstation section was made using program «Cortes».

Keywords: automated control system, power consumption.

**R. I. Gazizov**

**Evaluation of voltage signal fundamental harmonic frequency in railroad power supply systems**

The algorithm of evaluation of fundamental harmonic frequency in railroad power supply systems was suggested and developed on its model. The method satisfies the standards requirements by GOST P 13109-97 and IEC 61000-

4-30:2002. To illustrate the algorithm and its stability a simulation was done in Matlab.

Keywords: algorithm, stability, quality, signal, frequency, estimation.

#### INSTRUMENT ENGINEERING, METROLOGY AND INFORMATION-MEASURING EQUIPMENT AND SYSTEMS

V. A. Zakharenko, A. G. Shkayev

##### Technology of stabilization of parameters of optical electronics equipment

The methods and means for stabilization of basic parameters of receivers and sources of radiation of optical electronic measuring devices are developed. The examples of design of stable receivers and sources of optical radiation are presented.

Keywords: thermostabilization, optical electronic, receivers, sources optical radiation.

S. S. Grizutenko, E. A. Dumnova

##### Selection of components for OFDMA mode

The evaluation of capacity and performance of the signal processor for OFDMA mode is presented in this article. The number of bits is determined by the initial signal dynamic range and by signal attenuation in the channel. Furthermore, processor capacity is affected by noise that appears as a result of rounding-up during the FFT procedure. The processor performance is defined by such parameters as the bandwidth of the signal and the arithmetic operations capacity.

Keywords: OFDMA, dynamic range, Fast Fourier Transform, digital signal processing.

#### INFORMATION TECHNOLOGIES

V. N. Zadorozhnyi

##### Methods of calibration of stochastic additive graph generators

The theory of stochastic graphs simulating of large networks like the Internet is developed. The exact degree distribution for graph grown by generator with random number of edges is derived. Methods of generating graphs with the required distribution of the degree of connectivity are proposed.

Keywords: stochastic graphs, large networks structures.

E. D. Bychkov

##### The model of control of channel resource of queuing systems on the basis of fuzzy rules for output

In this work the mathematical model of management of channel resource a queuing system under control of three classes of commands management on object of a telecommunication network using fuzzy production rules is considered.

Keywords: a communication channel, fuzzy production rules, defuzzification, queuing system.

E. D. Bychkov, A. S. Kiyav

##### The algorithm of routing of data packets in the distributed control system on the basis of fuzzy preference matrixes

In this work the algorithm of routing in the structure of control system «Manager – agent» by a telecommunication network in which the signals of control are distributed in the network with conformity of the routing matrix constructed on the basis of fuzzy preferences matrixes is considered.

Keywords: routing, fuzzy preferences matrixes, telecommunication network

V. P. Sizikov

##### To imitative modeling on the DIS-technology base

The author uses DIS-technology in research and engineering. The authors propose the main notions and basics of the DIS-technology and show the work of the DIS-technology with natural differentials. The analytically determined and experimentally worked of the conformities to natural laws in the DIS-technology are exposed. We also propose here interpretations of the conformities to natural laws and several corresponding hypotheses.

Keywords: DIS-technology, natural differential, TDIS.

E. B. Yudin

##### Modeling stability of the Internet under condition of viruses propagation and random failures of network elements

The models of the Internet are often presented as large, complex, heterogeneous networks. Such networks are modeled on the basis of random graphs,

grown on the principle of «preferential attachment» or «rich get richer». In this paper, we use these graphs to model the propagation of the virus and the random element failures on the Internet. Actual data on a network of autonomous systems and Internet routers used to analyze the adequacy of modeling.

Keywords: random graphs, Internet, error tolerance, virus outbreak

E. E. Shmulenkova

##### The use of animation elements for graphic constructions checking system in «Self-education» mode

In this paper, the development of the software for a forming of imageries with members of animation is described. Developing the programs implementing animation motion it is offered to use five independent parameters of motion. By means of an animation pattern the stage-by-stage principle of a resolving of a task at what to each stage the certain changeable parameter of motion (the generalized coordinate) fits is shown.

Keywords: an animation pattern, movement of geometric objects, parameters of movement.

E. V. Leonova, A. B. Korobova

##### The use of apparatus of discrete optimization for teenagers' clothing computer-aided design considering psycho-physiologic comfort

The author analyzes basic data for teenagers' clothing design in accordance with the criteria of psycho-physiologic conformity. The author considers the possibilities of discrete optimization methods in solving tasks in the area of computer-aided design.

Keywords: teenager, humeral clothing, psychological type, warm condition, comfort, computerization.

#### RADIO ENGINEERING AND COMMUNICATION

E. I. Algazin, A. P. Kovalevsky, V. B. Malinkin

##### Invariant system with non-linear processing of signals and weak correlation

The invariant system of processing of information based on square-law characterized non-linear processing has been synthesized. Non-linear processing consists in calculating of the modules of informative and training signals. On the output the modulating parameter is equal to the relation of the modules of the informative and training signals. On the input side the relationship of these modules is calculated.

By calculating the parameters of such kind of system it is assumed that the readings of sub-carrier are interfered with the additive noise and weakly correlated with each other.

Quantitative estimation of the operation of such kind of system is compared with the quantitative indicators of the classical system with amplitude modulation and with the characteristics of the invariant system based on extended synchronous detection.

Keywords: noise immunity; invariant; probability of pairwise transition; signal/noise relation.

V. S. Budyak

##### Criteria for evaluation and results of experimental research on EMC of combined short-wave radio relay centers

The paper presents the results of definition of EMC evaluation criteria, development of engineering techniques for evaluation EMC and the usage of common techniques for experimental testing EMC for combined short-wave radio relay center.

Keywords: combined radio relay center, electromagnetic environment, experimental testing techniques.

I. D. Zolotarev, V. A. Berezovskiy

##### The method for increasing sensitivity of short-wave signal detector

Short-wave signals due to ionospheric reflections can broadcast over significant ranges of about 1000 km and more. In this case the level of the signals received by the detector can be 60-100 dB below the noise level. To provide sufficient reliability of received messages PSK sequences with subsequent correlation processing are usually used. Such detectors can operate having a priori information on the PSK code and radiation source frequency. While monitoring the signal sources of this range as a rule there is no required initial information and a low-level signal at the receiver input does not allow decoding its code and frequency. In this connection the problem of increasing the sensitivity of such detectors appears quite urgent. A nonconventional way of constructing the short-wave signal detector is considered that allows the essential increase in the receiver sensitivity.

Keywords: PSK sequence, radiation source monitoring within the short-wave range, local oscillator frequency substitution, correlation processing



**В ПОМОЩЬ СОИСКАТЕЛЯМ И АСПИРАНТАМ.  
СОВЕТЫ ПО ЗАЩИТЕ ДОКТОРСКИХ И КАНДИДАТСКИХ ДИССЕРТАЦИЙ В ОМСКЕ  
(информация с сайта ВАК на 26.01.2010 г.)**

Организация, при которой действует совет	Шифр совета	Специальности совета
Омская государственная медицинская академия	Д 208.065.01	14.01.17-14 14.01.01-14 14.01.01-14
Омская государственная медицинская академия	Д 208.065.02	14.01.14-14
Омская государственная медицинская академия	Д 208.065.03	14.02.01-14 14.02.02-14
Омская государственная медицинская академия	Д 208.065.04	14.01.04-14 14.03.02-14 14.03.03-14
Омский государственный педагогический университет	Д 212.177.02	13.00.01-13 13.00.08-13
Омский государственный технический университет	Д 212.178.01	05.11.13-05 05.12.04-05
Омский государственный технический университет	Д 212.178.02	05.04.03-05 05.04.06-05 05.14.04-05
Омский государственный технический университет	ДМ 212.178.03	05.09.01-05 05.09.03-05
Омский государственный технический университет	Д 212.178.06	01.02.06-05 05.02.02-05 05.02.18-05
Омский государственный технический университет	Д 212.178.09	05.04.13-05
Омский государственный технический университет	Д 212.178.10	05.16.09-05 05.02.13-05
Омский государственный технический университет	Д 212.178.11	02.00.04-02
Омский государственный технический университет	ДС 212.014.01	05.07.02-05 05.07.06-05
Омский государственный университет им. Ф. М. Достоевского	Д 212.179.01	08.00.05-08
Омский государственный университет им. Ф. М. Достоевского	Д 212.179.04	01.04.02-01 01.04.07-01
Сибирская государственная автомобильно-дорожная академия	Д 212.250.01	05.23.11-05
Сибирская государственная автомобильно-дорожная академия	Д 212.250.02	05.05.04-05
Сибирский государственный университет физической культуры и спорта	Д 311.001.01	13.00.04-13 13.00.08-13
Омский государственный педагогический университет	ДМ 212.177.04	07.00.02-07
Омский государственный технический университет	ДМ 212.178.03	05.09.01-05 05.09.03-05
Омский государственный университет им. Ф. М. Достоевского	ДМ 212.179.02	10.02.01-10 10.01.01-10
Омский государственный университет им. Ф. М. Достоевского	ДМ 212.179.05	01.04.03-01 01.04.04-01
Омский государственный университет им. Ф. М. Достоевского	ДМ 212.179.07	01.01.06-01 05.13.18-01
Сибирская государственная автомобильно-дорожная академия	ДМ 212.250.03	05.01.01-05 05.13.12-05
Сибирская государственная автомобильно-дорожная академия	ДМ 212.250.04	08.00.05-08
Омский государственный университет путей сообщения	ДМ 218.007.02	24.00.01-09,07
Омский государственный педагогический университет	К 212.177.01	13.00.02-13