CONTENTS

SUMMARY

ENGINEERING GEOMETRY AND COMPUTER GRAPHICS

O. B. Ilyasova, V. Ya. Volkov
Graphical and analytical method for constructing variety (surfaces) in the space of En

General algorithm for constructing cyclic varieties of computational geometry methods discussed in this article. Apolonia task is taken as an example.

Keywords: Design, enumerative geometry, cyclic surface.

W. A. Korotky
Quadratic transformation of the plane, fixed bundle conics

We consider all options of quadratic cremona transformation, fixed bundle conics arising from the coincidence in various combinations of the basic points of the bundle. There are examples of considered transformation usage in geometric modeling problems. We develop a program of tracing curve of the second order, which is given with a set of five points and tangents, having a wide range of practical using.

Keywords: curve of the second order, bundle of curves of the second order, polar correspondence, bundle of circles, homology, quadratic involution.

M. A. Chizhik, M. N. Moskovtsev, D. P. Monastyrenko
Geometric modeling of multiple factor processes based on projection algorithms

The methods to create drawings of multidimensional objects were reviewed in this article. The algorithms of constructing models on the Radishchev drawing were analyzed. The generalized algorithm of sectioning a multi-parametric surface by level plane based on two-dimensional computing was formulated, allowing to get results of solving optimization tasks with various number of incoming and outgoing parameters.

Keywords: algorithm, multi-dimensional geometry, modeling, optimization, projecting, Radishchev drawing.

PHYSICAL AND MATHEMATICAL SCIENCE

I. I. Gonchar, E. G. Pavlova, I. A. Drozdova, A. L. Litnevskiy
The accuracy of Kramers formula: the two-parabola potential case

It is shown that in the case of the two-parabola potential Kramers formulas, describing the rate of the thermal decay of the metastable state, sometimes result in up to 20 % error. Systematic comparison Kramers rates with the long time limit of the dynamical rate is performed for the overdamped motion. The integral Kramers rate has been found in much better agreement with the results of dynamical modeling than the conventional exponential expression.

Keywords: the thermal decay of the metastable state, Kramers rate, Smoluchowski equation.

O. N. Goncharova
Convective fluid flows under action of the co-current gas flows: mathematical modeling, numerical investigations

In the paper a review of the results of the mathematical modeling of the convective fluid flows in the domains with interfaces is presented. The examples of the solutions of a special type, which describe the three-dimensional convective flows are constructed.

Keywords: convection; interface; mathematical models; exact solutions

V. I. Zorkaltsev, S. M. Perzhabinsky
Interior point algorithms for linear and nonlinear programming

Obtained by the authors results of design and theoretical justification of the interior points algorithms for linear and convex programming problems are considered. The ways of improving of computational efficiency of the interior point algorithms are discussed.

Keywords: interior point algorithms, quadratic approximations of constraints, linear programming, convex programming.

A. A. Kolokolov, M. F. Korbut
Solving the set packing problem with restrictions of block type

We consider the set packing problem of block structure. For solving this task special L-classes enumeration algorithm is constructed. An algorithm reducing the matrix to block form is proposed. Experimental comparing of the algorithms on different series of test problems is held.

Keywords: operations research, integer programming, set packing problem, L-class enumeration algorithm.

V. V. Kalashnikov, V. A. Bulavsky, N. I. Kalashnikova
Consistent conjectural variations equilibrium in a mixed oligopoly

In this paper, conjectured variations equilibrium states (CVEs) in a mixed oligopoly model are studied. The agents make conjectures concerning the variations of the clearing price as a dependence upon variations in their production volumes. The existence and uniqueness theorems are established for the conjectured variations equilibrium (called an exterior equilibrium) for any set of feasible conjectures. To introduce the notion of an interior equilibrium, the authors develop a consistency criterion for the conjectures (referred to as influence coefficients). Next, an existence theorem for the interior equilibrium (understood as a CVE with consistent conjectures) is proved.

Keywords: variation equilibrium, oligopoly model, production volumes, convergence

A. A. Magazev, V. V. Mikheev, I. V. Shirokov
Method of non-commutative integration in problems of theoretical physics

Applications of the method of non-commutative integration of linear differential equations to the various problems of theoretical physics are reviewed in the article.

Keywords: differential equations, Lie group, Lie algebra, λ-representation, Klein-Fock equation, polarization of vacuum, heat kernel.

A. S. Filippova, Yu. I. Valiakhmetova
The theory of optimal resource utilization by L.V.Kantorovitch in scientific papers of Ufa school

There is given the description of creating the cutting-packing scientific school in Ufa run by E.A.Mukhacheva whose researching work followed the genius ideas of Nobel Prize laureate L.V.Kantorovitch in the field of optimal resource utilization. A short review of the problems and methods of their solution developed by Ufa school for 50 years is offered.

Keywords: optimal resource utilization; cutting-packing problems; linear programming; combinatorial methods.

L. V. Larina
Computer testing systems of students' knowledge on various steps of assessment

In this article it is provided an overview of computer testing systems of students' knowledge developed and applied in Russian universities.

Keywords: testing, computer testing, control of knowledge.

D. V. Ulyanov
Decomposition of the vector field of control system by constructing a homotopy operator

A method for the decomposition of the vector field of a dynamical system based on the construction of the homotopy operator is proposed in this paper. The decomposition of the vector field of multi-parameter dynamical system is considered. The invariants are constructed for the components of a vector field decomposition. The method of decomposition of the vector field of the dynamical system is used in the construction of Lyapunov functions for control systems.

Keywords: decomposition of the vector field, the control system, Lyapunov function, Hodge-Helmholtz decomposition, operator of homotopy.

CHEMICAL SCIENCE

A. A. Slepterev, P. G. Tsyrul'nikov
Palladium catalysts on alumina modified by RZE oxides

The kinetic data of methane complete oxidation on palladium catalysts supported on alumina modified by oxides of rare earth elements present. Two sets of catalysts on alumina modified by two various methods were examined. The recommendations for practical using of these catalysts were done.

Keywords: palladium, catalyst, alumina, oxides of rare earth elements.

A. A. Slepterev, K. N. Iost, V. L. Temerev, V. P. Talzi, N. N. Leonteva, P. G. Tsyrul'nikov
Modification of difection structure of alumina support after acid treatment

The interaction of HCl solutions of various concentrations which modeled the impregnation solutions of H_2PtCl_6 (H_2PdCl_4) for Pt(Pd)/γ-Al_2O_3 catalysts preparation, with γ-alumina support was studied. It was shown that by HCl treatment of γ-Al_2O_3 the partial dissolution of support takes place. The deposits obtained from extract solution were calcinated with forming amorphous Al_2O_3 (XRD), containing penta coordinated Al^{+3}, stabilized by Cl- ions (NMR). It was based that the interaction of acid impregnation solutions with γ-Al_2O_3 led to formation of layer of amorphous aluminium oxide in supports pores. On the defective sites of amorphous aluminium oxide, besides tetra- and octacoordinated Al^{+3} ions, partially on surface fragments, containing pentacoordinated Al^{+3} ions, stabilized by Cl-ions, the precursors of active component $PtCl6^{-2}$ (or $PdCl4^{-2}$) — ions were adsorbed.

Keywords: Pt(Pd)/γ-Al_2O_3 catalysts, acid treatment, defective structure.

MECHANICAL AND THEORETICAL ENGINEERING

A. I. Volodin, L. Yu. Mikhailova, Yu. P. Makushev
The reasons of formation of coke in the injectors spray nozzles of diesel engines

The paper presents the reasons for the formation of coke in the nozzle openings of which are major breakthrough of the gas cylinder diesel engine in the spray chamber and the temperature rise of its case, recommendations for reducing coking spray nozzle during operation.

Keywords: nozzle, needle nozzle, the breakthrough of gases, temperature, coke, coking.

E. N. Eryomin, Yu. O. Filippov, G. N. Minnekhanov, B. E. Lopaev
Research of phase transformations in ZhS6U alloy by methods of the thermal analysis

Research of kinetics of crystallization processes and phase transformations in ZhS6U alloy are carried out. It is shown that modifying leads to structure change in alloy, conditions of crystallization and allocation of the main and superfluous phases.

Keywords: heat resisting nickel alloy, modifying, the thermal analysis, crystallization, eutecticum, a strengthening phase.

S. A. Kornilovich, V. L. Solov'ev
Provision of threaded connections leakproofness during production, maintenance and repairing of agricultural machines

The article states main faults which appear in operation of agricultural machinery due to inaccurate and uneven threads tightening during units assembling. It proves imperfection of preload force control of threaded connections and a mathematic relationship between torque and preload force. It indicates the method of torque controlled preloading accuracy increase.

Keywords: threaded connection, torque, preload force, coefficient of friction, torque wrench.

V. I. Kuznetsov, E. A. Cherevko
The shape of the vortex tube fitting

The work is devoted to defining the optimal form of the inner surface of the pipe to drain the cooled gas stream from the vortex

tube. It is shown that in order to reduce hydraulic losses and improve the thermodynamic efficiency of the vortex tube forming the inner surface of the pipe to drain the cooled gas stream from the diaphragm to be a hyperbola, and the pipe — a truncated hyperboloid.

Keywords: vortex tube, pipe, the inner surface, hyperbole, a truncated hyperboloid

A. P. Morgunov, D. V. Pogodaev
Design and technological provision to durability of threading join of finger with nut of track of military caterpillar

In this article the nut design with undercut, applied in carving connection of the finger and nut of track caterpillar vehicles is considered. Calculations of distribution of loading for threads and distributions of tension are given. Application of nut with undercut increases durability of connection.

Keywords: track, finger, nut, carving connection.

V. G. Tsyss, M. Yu. Sergaeva
The optimization of rubber-metal shock-absorber parameters using the final elements method

It is investigated the suggested rubber-metal shock-absorber design with adjusting (modifying) technical parameters. On the base of final elements method the stress-deformed condition realized in the software application SolidWorks Simulation and optimization of its geometrical parameters is carried out.

Keywords: rubber-metal shock-absorber, stress, displacement, load performance, stiffness, deformation.

V. E. Scherba, A. K. Kuzhbanov, E. A. Pavlyuchenko, G. A. Nesterenko, V. S. Vinichenko
Mathematical model of operation processes of piston pump-compressor with gas air-cushion

The work is dedicated to mathematical modeling of operation processes, running in gas and liquid cavity of the pump of the compressor with gas air-cushion. The Broughted methodses of the calculation for thermodynamic parameter in gas and liquid cavity of the pump-compressor with gas air-cushion and is presented by results of mathematical modeling.

Keywords: compressor, pump, piston, worker processes, liquid, gas.

A. V. Zhdanov, Yu. E. Merkusheva
Theoretical studies of the operation processes in the hydraulic valves of steering mechanisms

The work of hydraulic steering system and describes its main elements is examined. There are built plots of the influence of centering spring stiffness and a positive control valve of blocking channels on the formation of the transitional processes in the system.

Keywords: three-dimensional hydraulic steering, hydraulic steering, centering spring stiffness, the angle of the positive overlap of the distributor channel, mathematical model.

Yu. K. Korzunin, V. P. Rasshchupkin, O. Yu. Bourgonova, D. A. Tsurkan
Re-crystallization curve and properties of cast high-speed steel 10Р3М3Ф2

The problem of re-crystallization in steels, including high-speed steel, makes the important section of metal science and solid-state physics. Hot plastic deformation is the basic technological process at producing some the tool, in particular, drills. The information on variation structure and properties of cast high-speed steel 10R3M3F2 is received.

Keywords: high-speed steel, re-crystallization, hot deformation, plasticity.

A. P. Lukinov, A. N. Syromyatin
Mathematical conditions for manipulation of object by anthropomorphic gripper under condition of geometrical closure in 3-dimention space

In this paper mathematical conditions for manipulation of object by anthropomorphic gripper under condition of geometrical closure in 3-dimention space are considered. Authors propose volumetric solid body forward and rotary stillness mathematical criteria which can be used for creation of software for anthropomorphic gripper control system.

Keywords: anthropomorphic gripper, object of manipulation, form closure, force closure, secure holding, bounded connected set of points.

V. A. Penner, S. D. Alzhanov
Repair and control of conic thread of pump and compressor pipes used for oil production

The way of control of a conic thread of pump and compressor pipes is offered at repair.

Keywords: pump and compressor pipe, control, repair.

A. A. Razhkovsky, A. G. Kisel, D. S. Rechenko, A. A. Fedorov
The lubricant cooling liquid impact to cutting forces in turning processing of titanic alloy VT3

In the article machining of metals basic elements of technological system are influenced by the forces resulting deformation of the cut-off layer of metal and a surface of the processed detail, and also force of the friction on lobbies and back surfaces of the cutting tool. Application of lubricant cooling liquid (LCL) reduces forces of a friction on forward and back surfaces of the cutting tool that promotes reduction of forces of cutting.

Keywords: turning processing, cutting forces, titanic alloy, lubricant cooling liquid.

A. P. Shevchenko, I. O. Korobkin
Motion of an air and grain mixture in a flat seeds distributor

The device and principle of work of the flat distributor of seeds allowing in regular intervals to distribute seeds of various cultures on shares are given. The theoretical model of motion of an air-grain mixture is developed. There are obtained results connect physicomechanical properties of the mixture and kinematic parameters of the seeds distributor.

Keywords: seeds distributor, the guide, turbulator, mobile distributive partitions, air-grain mixture, heterogeneous stream.

A. P. Shevchenko, A. N. Lukin
Motion of seeds on spiral surface of pneumatic scarificator

There is given device and principle of operation of pneumatic scarifier, which allows to handle efficiently and seeds of perennial legumes. A theoretical model of the motion of seed by the spiraling working body is developed. The resulting differential equations can determine the coordinates of the location of kernel and its speed at any time.

Keywords: scarifier, air flow, spiral, sediment chamber, trajectory, steady motion.

A. B. Yakovlev
To a question of a choice of the scheme of the propulsion system of the aircraft

The analysis of the main schemes of the liquid rocket engine with pump system of supply of fuel is considered in the article. The maximum specific impulse of thrust is chosen as criterion of optimization. The results can be useful to the experts who are engaged in dealing with liquid rocket engines.

Keywords: liquid rocket engine, pump system of giving, specific impulse of thrust.

I. M. Zuga, V. G. Khomchenko
Penalty function formation at the automated designing of the objects schemes locating on industrial complexes

The mathematical model of the penalty function allowing to consider one of the main additional conditions of optimizing synthesis of objects schemes location namely, regulated, minimum admissible distances on a gleam between objects, is offered. The received analytical dependences are adequately universal and reflect the most characteristic design situations.

Keywords: the automated design, penalty function, the scheme of an arrangement objects.

A. Yu. Kazakov
Development of methodology for preliminary assessment of the characteristics of traction propulsion system on a «gas-gas» from the time-dependent composition of the fuel mixture

The article deals with the comparative characteristics of the basic parameters of the traditional liquid-propellant rocket motors and gas engine developed using non-stationary part of the fuel mixture. The basic assumptions and presents a preliminary calculation of the estimated structural and technological parameters of the engine being developed for the block «I» and the block «A» « Soyuz 2.1v.»

Keywords: liquid residues from propellants, gasification, the engine on a «gas-gas» project design parameters, theoretical and experimental research.

A. N. Orlov, D. N. Algazin, E. V. Krasilnikov
The influence of parameters of crest maker cultivating dumping type to make crests

Results of experimental research on the impact of the main geometrical parameters of the dump crest maker cultivating dumping type on the quality of the technological process yields in cultivation of corn and identify the best values of these parameters.

Keywords: crest maker, crest, working body, specific volume, depth of processing, dump.

E. A. Cherevko
Modern hypotheses of formation of process of power division in vortical pipes

The basic modern hypotheses and sights on process of formation of Ranque effect in vortical pipes are considered. The comparative analysis of these hypotheses is made according to the laws of thermodynamics, thermal physics and gas dynamics of vortical currents. A number of conclusions, that the reason of vortical effect — viscosity and heat transmission is made.

Keywords: vortical effect, hypothesis, heat transmission, viscosity.

A. L. Akhtulov, L. N. Ahtulova, A. Yu. Mustakova, S. T. Tashmagambetova
Assessment of productivity of system of quality management as the tool of improvement of activity of organization

In the article some recommendations which will help the organizations to develop and introduce own techniques of estimation of productivity of systems of quality management (SQM) are considered, the technique of evaluation of productivity of processes is offered. The primary goals on estimations of productivity SQM are formulated. The selection of criteria on their importance is considered.

Keywords: process, productivity, efficiency, system of quality management.

ELECTRICAL AND POWER ENGINEERING

S. S. Girshin
Temperature records of network elements when selecting measures to reduce the losses of energy in case of reactive power compensation

In this article, the author analyzes the effect of temperature dependence of the resistance on the results of the choice of measures to reduce the losses and the expediency of considering this factor with common positions on specific examples.

Keywords: loss, insulated conductor, measures, BSC, capacity.

A. A. Bubenchikov, A. V. Bubnov, S. S. Siromakha, E. M. Sarzhanova, D. E. Khristich
Calculation of parameters of mathematical model for calculation losses of electric energy for the complex of sections of self-supporting insulated wire for temperature

This article discovers the idea of using the chain-field approach for the calculation of self and mutual thermal resistance, temperature and electricity losses four-supporting LV overhead power lines and communication, it discloses thermal resistance of the equivalent circuit of the four-SIP with the heat transfer coefficient of heat transfer by convection and radiation. The algorithm for calculation of coefficients of approximation of functions linking self and mutual thermal resistance is presented.

Keywords: power loss, temperature, single-ended mode, load, the thermal resistance, four-wire system.

S. S. Girshin V. N. Goryunov, E. A. Kuznetsov A. V. Karpenko
Simplification of the heat balance of overhead power lines in the problems of calculation of the energy loss

The paper presents the results of applying the least squares method to simplify the heat balance of overhead power lines in the problems of calculation of the energy loss. There are also proposed formulas and analyzed its accuracy compared with previous methods.

Keywords: heat balance equation, airlines, energy losses, forced convection, the approximation of the equation.

S. S. Girshin, E. V. Petrova, V. I. Surikov
Calculation and analysis of active power losses in the network elements based on analytical expressions taking into account the temperature dependence of resistivity

The article calculates and analyzes active power losses with the temperature dependence on resistance. It is carried out qualitatively and quantitatively evaluation of changes of the method of calculation and calculation formulas taking into account the temperature dependence on resistance.

Keywords: loss, active power, resistance, temperature, heat transfer.

A. V. Ded, A. I. Volynkin, M. Yu. Denisenko, N .V. Kirichenko, E. S. Sukhov
Additional losses of capacity in electric networks under asymmetrical loading

The importance of the problem of improvement of quality of electric energy is designated. The asymmetry of tension in three-phase system is considered. Methods of definition of additional losses of capacity are dveloped.

Keywords: additional losses of capacity, asymmetry of tension, quality of electric energy, methods of definition of losses of capacity.

S. Yu. Dolinger, A. G. Lyutarevich, D. S. Osipov
Control value voltage on condensers compensating device in a four-wire three-phase network for improving power quality

This paper is devoted to a problem of quality power. Three schemes of active filters for a four-wire three-phase network are considered. The problem of imbalance voltage on condensers of the active filter is mentioned at the scheme with the divided condensers. In the paper it is presented the schematic solution of the active filter which allows to solve a problem of imbalance voltage, but thus, having left possibility of independent control shoulders of the power bridge. That will allow to create simple and fast algorithm of control on the basis of the theory of instant capacity.

Keywords: power quality, active filtering, active filter, imbalance voltage.

N. V. Kirichenko, E. V. Petrova
The analysis of results of temperature modeling in bare wires of overhead lines of electric power systems with influence of solar radiation

The article describes the method of accounting the effect of solar radiation on the temperature of the wires overhead lines. The analysis of these techniques in terms of accuracy of modeling, as well as their practical application is done. The recommendations on the inclusion of the effect of solar radiation are given.

Keywords: temperature, heat, solar radiation, non-isolated grounding connection, load carrying capacity.

A. G. Lyutarevich, V. N. Goryunov, S. Yu. Dolinger, K. V. Khatsevskiy
Modeling devices ensuring power quality

This article deals with simulation devices of power quality in distribution networks. The model of the power system with nonlinear

and asymmetrical load and the model of power quality device and management systems are developed. Additionally, power quality is assessed before and after switching on the appliance.
These research is carried out with financial support from the government by the Ministry of Education and Science of Russia.

Keywords: power quality, modeling devices ensuring the power quality.

A. A.Plankov, D. S.Osipov, V. A. Plankova, V. L. Yusha
Modeling critical modes of assembly of electric power systems with asynchronous load in the study of static stability on power frequency

The article is devoted to development algorithm for the study of static stability of the assembly of electric power systems with asynchronous load. The use of full T-equivalent circuit of an induction motor, which improves the accuracy determine of the parameters of the engine is presented.
Also the article deals with development of modern software package for calculating the parameters of critical modes in the assembly load.

Keywords: criteria of stability, asynchronous load, the critical voltage.

S. S. Siromakha, A. A. Bubenchikov
Alternative methods for characterization of quality of electric power. Wavelet analysis

The article describes the problems of defining the parameters of power quality, the comparison of conventional and wavelet analysis methods current and voltage signals.

Keywords: wavelet analysis, Fourier transform, the quality of electric energy, the higher harmonics.

V. D. Avilov, E. A. Tretyakov, A. V. Krause
Quality control of electricity in the distribution network of rail transport

Despite significant progress in the development of accounting systems, there is almost universal increase in the reporting of energy losses and reduce its quality.
Along with the introduction of modern energy-efficient electrical problem more efficient use of electrical energy in the stationary energy sector can be addressed through the introduction of adaptive technologies-active management of the compensating devices controlled by means of control voltages, switching and power equipment, and their diagnosis based on digital technology, including automatic maintenance of a minimum transmission losses when the load. The system of site management of Non-tractive power of consumers on the basis of active-adaptive technologies and software system optimization mode parameters in real time is developed.

Keywords: Quality of electric power, facilities management, optimization of the profile, the program complex, intelligent network

V. K. Fedorov, I. V. Fedorov
Entropy aspects of efficiency, stability and survivability of electric power systems

Some problems of reliability and stability of functioning of difficult electric power systems are considered in this article. Various approaches to assessment of admissible not balances of knots of such systems are analyzed. The way of definition of the stability, based on the developed methods of calculation and the description of modes of electric power systems and definition methods of admissible modes is offered.

Keywords: electric power system, entropy, operating modes

V. L. Yusha, G. I. Chernov, N. A Raykovsckiy
Analysis of the impact of properties of the coolant recovery system heat losses of combined compressor-power plant on its characteristics

The paper presents results of theoretical analysis of the effectiveness of an ideal thermodynamic cycle internal combustion engine combined with an external utilization of exhaust heat. The influence of the properties of the coolant circuit of utilization on its operational parameters and characteristics of the power plant is revealed.

Keywords: working cycle, combustion chamber, heat recovery, heat transfer.

S. N. Chizhma, R. I. Gazizov
Method of spectral analysis of signals in power supply systems

This article describes a method of harmonic analysis of signals in power networks, allowing to estimate the frequency, amplitude and phase of harmonic voltage and current in the presence of noise and the deviation of the fundamental frequency.

Keywords: frequency, harmonics, the amplitude, phase, fast Fourier transform, the smoothing window.

S. N. Chizhma, R. I. Gazizov
Analysis of the accuracy of the method of spectral analysis of signals in power systems

The article identifies factors that determine the accuracy of the proposed method are shown depending on the accuracy of analytical evaluation, the evaluation process is simulated signal parameters and comparing results with smoothing windows of various types.

Keywords: frequency harmonics, the amplitude, phase, modeling, precision.

M. V. Semenyak
The statistical models of deviations and tension fluctuations

In this article the diffusive model of deviations of tension is considered. There is received the equation of diffusion of probability at free evolution of system of power supply of lighting installations. Besides, in article the entropy model of deviations and tension fluctuations is described.

Keywords: probability density, evolution, model of deviations, casual process, tension deviation.

A. Yu. Kovalev
To a question of the use of apparatus of conformal mappings for modeling systems electric centrifugal pumps

The possibility of modeling and research the parameters of electrical systems installations electric centrifugal pumps, in terms of the functional impact of a number of factors that vary over time, with the use of specialized, accurate mathematical apparatus of conformal mappings. As a mathematical tool to study the parameters of the «IECP — oil well - layer» it is proposed to use a faster and more accurate than the classical matrix, the unit of conformal mappings.

Keywords: install electric centrifugal pumps, the theory of functions of complex variables, nomograms, four-pole, apparatus of conformal mapping, a linear fractional transformation.

INSTRUMENT ENGINEERING, METROLOGY AND INFORMATION AND MEASURING SYSTEMS

Yu. N. Klikushin, V. Yu. Kobenko
Way of interpolation identification in distributions

A method for interpolation of the distribution of the signal between the reference points of the identification scale is proposed. The possibility of using this method for comparing signals is demonstrated.

Keywords: distribution, identification scale, interpolation, form measurement, signals, tester.

INFORMATION TECHNOLOGIES

V. N. Zadorozhnyi
The rapid method for calculation the fractal queueing systems

Specific problem of modeling nodes of computer networks, caused by the fractal nature of their traffic, are discussed. The quick method of calculating fractal buffer of queuing systems is proposed.

Keywords: queuing system, fractal traffic, simulation.

V. N. Zadorozhnyi, E. S. Ershov
Optimization of non-markovian queuing networks by reallocating resources and transition probabilities

The new effective analytical-simulation optimization method of non-markovian networks with queues by reallocating resources and transition probabilities is offered. Speed of convergence and accuracy of a method are experimentally estimated. Practical recommendations about method's application are given.

Keywords: a network with queues, simulation, optimization, analytical-simulation modeling.

A. M. Purtov
Development and analysis of simulation model of crossroads for system GisAuto

The simulation model of crossroads is developed for system GisAuto. The model is programmed by GPSSW. The comparative analysis of adaptive and not adaptive control systems by traffic lights at crossroads is made.

Keywords: crossroads, queue of cars, conceptual model, simulation, a control system of traffic lights, results of experiments.

A. M. Purtov, O.G. Chanyshev
Simulation of matrix games as a method of analysis of practical strategy of decision-making

Results of the use of simulation for comparative analysis of practical strategy of decision-making are described. The quality of strategy is estimated by means of matrix games.

Keywords: strategy of decision-making, simulation, matrix games.

A. N. Florensov
Application of the first law of cybernetics to analyze the dynamics of complex adaptive systems

It is shown that the first law of cybernetics, transformed into a differential form, provides a basis for solving a number of common systemic problems of the real world. There is suggested its application to the study of problems of formation of mind in learning and the dynamics of civilizations. The solution of the Fermi paradox is revealed based on the review of formal grammar for withdrawal of the internal diversity of knowledge systems studied three classes of systems of knowledge and the applicability of test methods for their formation and evaluation.

Keywords: cybernetics, control, entropy, dynamics, variety, learning, adaptation.

RADIO ENGINEERING AND COMMUNICATION

Yu. M. Veshkurtsev, N. D. Veshkurtsev, E. A. Fadina
Radiostatical method for quality control. Part 2

The paper presents physical and mathematical models of interaction of electromagnetic field with substance that considered in the framework of radio physics widely used in the study of a random inhomogeneous medium. Stochastic characteristics of electromagnetic waves, that transmit through the substance, are researched. The results suggest that stochastic characteristics define integral indicator of quality of substance. Integral indicator is labeled on a scale of values of the stochastic characteristics.

Keywords: substance, randomly inhomogeneous medium, electromagnetic field, signal, stochastic characteristics, integral indicator of quality, scale of values.

V. Yu. Kobenko
Multiplication operation of random signal distribution on the number in identification numbers space

Results of modeling of multiplication operation of number on random signal distribution in space of identification numbers are presented. The description and performance technology of the given multiplication operation is given. The identification numbers are understood as the numbers of a order scale quantitatively characterizing the signals form

Keywords: identification, identification algebra of distributions, identification measurements, classification, random signal, order scale.

T. S. Khrolenko, A. I. Tyumentsev, A. N. Yakovlev, V. P. Kismereshkin
Experience of realization LC-filter integrated in structure of multilayer printed circuit board

Step by step the method of realization of LC-filter integrated in the structure of multilayer printed circuit board are shown. Evaluations of circuits of lowpass filters, bandpass filters and its constructions are performed. Analysis and investigation of prototypes are performed. General advantages of such type of filters are shown.

Keywords: LC-filter, multilayer printed circuit board, PCB-technology, lowpass filter, bandpass filter, response characteristic.

D. P. Chupin
Research of battery diagnostic methods

Investigations of batteries internal resistance and resonant frequency are made. The results are presented in graphs and approximating curves, which are chosen for them. The hypothesis is confirmed of possible use as diagnostic parameters internal resistance and resonant frequency of batteries.

Keywords: battery, rapid diagnosis, internal resistance, resonant frequency, capacity.