Contents

INFORMATION TECHNOLOGIES

RADIO ENGINEERING AND COMMUNICATION

Summary

PHYSICS AND MATHEMATICS

Yu. P. Chernov
Study of equilibrium membrane potential using model membrane

The purpose of the work is a study of balance membrane potential, that formed on both sides of an artificial membrane separating saline solutions of various concentrations.
The difference of potential on membrane is conditioned by the ion diffusion through membrane appearing at various concentration of saline solutions on both sides of membrane.
It is shown, that for the pilot model of cation conductive membrane, the potential is described by Nernst equation. In the case of the membrane, that conduct cation, the potential is described by Henderson equation.
The experiment results draw to conclusion about possibility of usage the equations by Nernst and Henderson for description of the mechanism of the passive ion transport through the model of membrane.

Keywords: the membrane, potential, diffusion, ions, concentration.

V. N. Zadorozhnyi, E. B. Yudin
Definition, generation and application of statistical homogeneous random graphs

The concept of statistically homogeneous graph is presented. Such random graphs as scale-free or Poisson graphs are studied on the basis of the proposed approach. The accelerated methods of graph generation are proposed as a result of theoretical studies. Also the methods of obtaining statistic's homogeneous graphs based on the evolution of cellular automata and the process of decomposition of nodes / vertices are offered. The application of these graphs for modeling a number of relevant networks and structures are discussed.

Keywords: statistical homogeneity of random graphs, accelerated methods to generate of scale-free and Poisson graphs, statistical homogeneity planar graph.

V. N. Zadorozhnyi, E. B. Yudin
Precise theory of Barabasi-Albert graph

Barabasi-Albert graph using for modeling large networks like the Internet is analyzed. The analysis based on fundamental matrix Q, introducing precise expression of structural characteristics of the graph. We derive the precise formula of the Q-matrix. So, we establish the previously unknown and clarify widespread structural properties of the Barabasi-Albert graph.

Keywords: dynamic random graphs and large networks.

S. S. Gritsutenko
The isomorphism of dense and discrete Hilbert spaces in Digital Signal Processing

The isomorphism of dense and discrete Hilbert spaces is discussed in this article. Some examples and reasons of the isomorphism breaching are considered. Criterions of the isomorphism are instituted. Modified Delta-function is instituted too.

Keywords: DSP, isomorphism, DFT, digital filters, Delta-function.

V. K. Fedorov
The fundamental properties of Space and Time: solution for a problem of space-time localization of quantum objects

In the offered work the analysis of the problems concerning the foundations of philosophy and physics is submitted, namely: whether there are limits of space-time localization and how fundamental properties of physical Space and Time are bound to physical laws and the proof of discreteness of physical Space and Time following from this analysis.

Key words: discreteness, continuity, quantum of Time, quantum of Space.

N. G. Churasheva
Riman matrixes for hyperbolic system of the heat conductivity equations. An anisotropic body case

The hyperbolic system describing heat distribution process in an anisotropic body within the hyperbolic model of heat conductivity limits is considered. Formulas for the first and second sort Riman matrixes of this system are constructed.

Keywords: hyperbolic heat conductivity, an anisotropic body, Riman matrixes.

N. V. Melenchuk
Double step extra gradient method for the decision of saddle problems

Problems of the saddle point are important class of the problems, but the solution by standard methods faces difficulties with rigid imposed requirements. So working out new methods to solve similar problems effectively is actual.

Keywords: extra gradient, saddle point, optimization

CHEMICAL SCIENCE

V. A. Gorbunov, A. V. Myshlyavtsev, M. D. Myshlyavtseva, V. F. Fefelov
A Monte Carlo analysys of phase behavior of adlayer consisting of complex organic molecules

The self-assembling processes and phase transitions in adlayer consisting of complex organic molecules are investigated with Monte Carlo technique in grand canonical ensemble. It is shown that depending on temperature and chemical potential there are three ordered phases in the system (, and). Phase is formed by molecules with different orientation with respect to the surface. In the low temperature region (lower than critical) orientation changing process occurs via first-order phase transition.

Keywords: adsorption, Monte Carlo technique, self-assembled monolayer, first-order phase transition, second-order phase transition.

ENGINEERING GEOMETRY AND COMPUTER GRAPHICS

V. Yu. Yurkov
Enumerative problems for combinatorial structure varieties

This paper discusses a method for calculation of incidence conditions for flags of various dimensions. Some n-dimensional complexes of polyhedral type are described by means of these conditions. There are discussed some enumerative problems and its n-dimensional generalizations. However, knowledge of the enumerative method can provide a path to en even deeper expression.

Keywords: flag, incidence condition, decomposition formulas, polyhedral structure, complex.

K. L. Panchuk
Euclidian interpretations of elementary metric problems solution in elliptic plane

Solutions of elementary metric problems in an elliptic plane are considered. As its model in three-dimensional Euclidian space plane, a tangent to the sphere with identified opposite points is assumed. The offered solutions are based on application of constructive and metric properties of the elliptic plane circle.

Keywords: an elliptic plane, metric problems, a circle, the absolute.

MECHANICAL ENGINEERING

V. B. Masyagin
Development of the dimensional analysis on the basis of edge model application

The problems of the dimensional analysis are considered. The method of analysys of accuracy of the designs and technological processes of details of bodies of rotation and more complex phenomena is offered on the basis of drawing up the edge models of accuracy.

Key words: dimensional analysis, accuracy, technological, arrangement, detail, process, edge, model

S. M. Andryushechkin, S. V. Biryukov, A. V. Tyukin
Forecasting evaluation of metal-polymer tribosystem performance

The results of the study of tribo EMF arising in tribosystem metal-polymer composites based on polytetrafluoroethylene depending on the concentration of the filler - cryptocrystalline graphite are obtained. The dependence between tribo EMF and durability of Metal tribosystem is revealed. The method of prediction of metal-polymer friction knot tribo EMF performance is submitted.

Keywords: polytetrafluoroethylene, cryptocrystalline graphite, tribo EMF, rate of wear.

E. N. Eremin, A. E. Eremin.
Dispersed phases influence evaluation on the duability of cast components of machines

The influence of structural parameters of a dispersed phase in the content of the cast metal on dislocation dynamics and strength properties is investigated. Simultaneous significant improvement of strength and plastic properties

of metal are expected in modifying of cast metal by nanoparticles of refractory compounds together with surface-active substances.

Keywords: modifying, structure, dispersed phase, nanoparticles, dislocations, deformation, strength, cast metal

E. N. Eremin
Application of nanoparticles of refractory compounds for improving the quality of welding joints made of heat-resistant alloys

Electro slag welding by a combined electrode with modification of the weld metal by disperse particles of titanium carbonitride is proposed for manufacturing of circular billets used in energetic installation construction. Results of the weld metal investigation in welding of the KhN77TYuR alloy are presented. Advantages of new welding technology are demonstrated.

Keywords: electro slag welding, modification, refractory compounds, heat-resistant alloys, structure, mechanic properties

P. D. Balakin, E. A. Kuznetsov, P. A. Prozorov
Modeling of percussion interaction of a track roller of multitask caterpillar vehicle with a single road obstacle

On the basis of fundamental theory of analytical mechanics the mathematical model of percussion interaction of basic units of the caterpillar vehicle passing single obstacles is developed.
Levels of power dynamic loading defining working capacity of parts and joints of suspension are specified.

Keywords: track roller, impact, a shock impulse, force of impact.

A. V. Rudak, S. A. Makeev, V. G. Tyutneva
Estimation of the lowest frequency of own fluctuations in frame free cylindrical vault - shells

The algorithm of an estimation of the lowest frequency of own fluctuations in cylindrical shells is offered and implemented by J. Rayleigh method in MS Excel. The results of calculations of an example of cylindrical vault - shells as bearing trapezoid sheets are submitted.

Keywords: frequency, own fluctuations, method J. Rayleigh

V. Yu. Tetter, I. V. Fedorov, V. G. Shahov
Techniques of vibration signal processing for enhancement of depth and reliability of bearings diagnostics

The results of experimental research and mathematical processing of rolling bearings vibration signals were discussed. The defect's symptoms in spectra diagrams of vibroacceleration, vibrovelocity and vibrodisplacement are analyzed. The conclusion about possibility of using analyses of vibrovelocity and vibrodisplacement spectra diagrams for enhancement of depth and reliability of diagnostics is made.

Key words: vibration, diagnostics, bearing, spectra, defect, integration.

A. P. Morgunov, P. N. Lastovsky
Providing preset accuracy parameters of dimensional processing of thin-walled details of aircrafts

As it is known in mechanical engineering considerable share is occupied with details at which processing deflections of surfaces of details under the influence of the applied forces are commensurable with values of the admission on processing. Such details are blades, disks, rings of turbines, axial compressors and other products.
Occurrence of the specified deflections under the influence of forces of cutting and forces of fastening leads to errors of processing. In each case the range of errors changes widely taking into account the change of deterioration of a tool, a mode of cutting and other conditions.

Keywords: processing; thin-walled details; processing errors; accuracy of processing.

S. A. Korneyev, I. V. Krupnikov, S. N. Polyakov, V. V. Schalay
Deformation and destruction model for elastoplastic materials, determination of material parameters and reliability assessment

The method and algorithm of calculation of elastoplastic deformation processes and destructions of construction elements with application of defining parities of isothermal deformation of plastically incompressible materials based on two-level mathematical model are described in the article. Comparison of experimental data for stretching of samples with a sharp cut and the results received by the method of computer modeling proves the developed method and algorithm. Practical recommendations are given.

Keywords: elastic-plastic deformations, destruction.

L. O. Shtripling, M. G. Popov
Providing processing accuracy for complex case shape parts on the basis of combination of 5 DOF machine-tool and contact sensor

The lack of existent methods of control and processing for case shape parts are considered. On the example of modern machining center ability of combination of its processing and measuring functions it is presented how to shorten time of part inspection and increase its quality. The recommendations on perfection of the automated system of production increasing efficiency of its work are given.

Keywords: CNC machine tool, measuring, contact sensor, case shape parts

R. N. Eskenin
Weight coefficients of the generalized velocities in the motion algorithm of manipulation system in heterogeneous environment

The article considers the influence of the value of weight coefficients of the generalized velocities in the motion of the manipulation system in heterogeneous environment. These weight coefficients for the first time were used in the form of certain functional that took into account the environment properties offered the required and appropriate ways of calculation for their values. It is found that by varying the size of the weight coefficients of the generalized velocities by a given law it is possible to control a manipulation system (MS) in automatic mode and provide MS motion of at safe distance from obstacles. To solve the control problem of manipulation system it is offered a functional for defining and calculating the weight coefficients. We consider two (not only) ways of calculation taking into account positions of MS and obstacles. Varying the values of the weight coefficients it allows building the motion of MS in heterogeneous environment (environment with obstacles) taking into account obstacles.

Keywords: handling system, the algorithm of displacement, weight coefficient, the potential function, obstruction, heterogeneous environment.

I. M. Zuga, V. G. Khomchenko
Computer-aided design (CAD) of the facilities location under condition of communications expenses minimization

The mathematical model of optimization synthesis and algorithm of the Computer-aided design (CAD) applied for the location of the facilities with variable purpose under condition of communications expenses minimization and feasible minimum distances constraints considered between the facilities are proposed.

Keywords: Location of the Facilities, Computer Aided Design (CAD), marginal costs curve

O. T. Danilova
Study of heat and mass transfer for issuing recommendations on design of plasma reactor for decomposition of zircon concentrate

In this work the algorithm for calculation of parameters of heat and mass exchange processes of zircon concentrate particles with plasma flow of equilibrium frequency discharge is shown. Accounting polydispersity feedstock to determine the optimum flow rate, temperature and length of the reaction zone is carried out using the passage of D (d) and density of the logarithmic normal distribution of the particle diameters.

Keywords: plasma, reactors, plasma jet, heat and mass transfer.

A. G. Mikhailov
Questions of formation of nitrogen oxides during combustion of gaseous and liquid fuels

The problems of formation of nitrogen oxides during combustion of organic fuels set out in domestic and foreign literature in recent years.

Keywords: combustion, nitrogen oxides, thermal, fast, fuel.

A. G. Mikhailov, D. S. Romanenko
Stabilization of gas flows and turbulence in the furnace

The article considers the technical issues to ensure stability of the torch in a furnace. We offer to install vortex generators within the given space for intensification of convective phenomena and increasing heat release during combustion of gaseous and liquid fuels.

Key words: combustion, flame, stabilizer, turbulator.

E. O. Valuevich, A. E. Voronov, E. A. Voronov, E. Yu. Chkhetiani
The ways of research of the dynamic processes in web-fed printing machines

In this scientific article a problem of research of dynamic characteristics of web-fed printing machines is described, especially for the drives and folders of both one-color machines and multi-color devices. The special attention

is paid to the study of folder characteristics. The results of the research may be useful for maintenance and design of new technological machines.

Keywords: dynamics, printing machines, engine, folder

D. V. Dzubin, V. I. Ivanov
Methods of wear-out assessment for cylinder - piston ring pair in internal combustion engines of transport and technological machines

In the article the influence of external climatic conditions of operation on the efficiency of engine prestart heating is shown in the view of wear-out forecasting in cylinder - piston ring pairs, the technique of its calculation by probability methods is offered.

Keywords: pair a cylinder - piston ring, wear-out, distribution function.

V. V. Shalay, I. A. Tribelskiy, S. N. Polyakov
Method of calculation of necessary number and regularity of tightening of onboard rubber-cord casing at the initial stage of maintenance

The method of calculation of necessary number and regularity of tightening of onboard rubber-cord casing at the initial stage of maintenance taking into consideration loosening processes prior to installation is developed. The developed method proves to be by experiments.

Keywords: viscoelastic materials, deformation, stress relaxation, rubber-cord casing

A. L. Akhtulov, O. M. Kirasirov
Calculation of parts for crane mechanisms within equivalent loadings

The aspects of calculations on endurance of parts of load-lifting cranes for various technological purpose working under non-stationary variable loadings are considered.

Keywords: the load-lifting crane, calculation, variable loadings, dynamic loadings, cycling.

I. V. Denisov, V. A. Mescheryakov, V. S. Ityaksova
Modeling of the fuzzy control system for jib crane

The model of the fuzzy control system for a jib crane is suggested. The control algorithm contains experiment based rules. The results of the load motion modeling are presented, the program, fuzzy controlled and experimental trajectories of the load are compared.

Keywords: simulation, fuzzy control, jib crane.

A. V. Borodin, D. V. Taruta, T. V. Velgodskaya, Yu. A. Ivanova
Heavy-loaded support units of carriages and locomotives

New constructive solutions of highly loaded basic units of carriages and the locomotives are offered to raise its operational characteristics.

Keywords: bearing, durability, roller, axle-box

A. V. Borodin, V. V. Ivanov.
Theoretical study of intense-deformed condition of the wheel of the freight car passing the rail joint

In the article the specified mathematical model of interaction of a wheel of the freight car and a rail joint with defects is resulted. On the basis of the analysis of the intense-deformed condition of a wheel by a method of final elements the necessity of decrease in forces of shock interaction is proved. The technical solutions for decreasing shock influence from the joint on the wheel of freight car are offered.

Keywords: wheel, rail joint, intense-deformed condition.

D. V. Kazarin
Synthesis of algorithms for diagnostics of electric train circuits

Some results of program modules development for electric circuit diagnostics, operating as a part of software of the systems for complex diagnostics of electric trains sections are offered. These systems are commonly used at «Russian railways» and are promising for railway branch as a way of reliability increase, maximum use of electric train equipment resource with simultaneous decrease of expenses for repairs, and as a way of the rapid reconstruction of repair system based on safe resource-saving principles.

Keywords: model, electric train, diagnostic feature, diagnosis, reliability.

A. M. Minitaeva
The analysis of control methods of decrease of impact of transport engines on the environment

The article considers control methods taking into account considerable number of factors, technological and economic and characteristics of diesel engine performance.

Keywords: burnt gases, internal - combustion engine

A. M. Minitaeva, Yu. B. Grishina, M. V. Taryta, S. I. Akhmetov
The analysis of methods for decreasing of environmental impact by transport engines

The economy of oil energy sources, tightening standards of emissions of harmful substances of burnt gases of diesel engines, and restriction on carbon dioxide emissions force the majority of the countries to search for the ways of decreasing influence of thermal engines on environment.

Keywords: the ejection of gas, burnt gases, diesel engine, internal - combustion engine

V. S. Kazachkov, V. V. Shalay, A. A. Popov
Calculation of the error of the individual heat accounting system and distribution of heat consumption in apartment buildings

In the article the actual problem of metrological maintenance of the individual account of consumption of heat in apartment houses is considered. Calculations of value of the maximum error of distribution of thermal energy by system are resulted. Besides, calculation of value of an error of distribution for typical one-room apartment is resulted. The resulted calculations show that the error of distribution does not bring considerable distortions in the distributed value of consumption of heat separate apartment that confirms expediency of introduction of systems of the individual account and distribution of consumption of heat in practice of the account of heat.

Keywords: systems of the account of heat, an error of system of the account of heat.

Yu. E. Ponomarenko, A. S. Nesterov
The experience of using equipment for pile driving by the method of impressing in Omsk

The article is devoted to comparison of application the pile-impression method while using various types of pile-impressing equipment. We carried out the analyses of pile-impressing plants diagrammatic work in the process of pile footing arrangement in different ground conditions, with the use of piles of different length, being bedded by the method of static impression.

Keywords: a method of impressing, a pile, a solid ground, ballast.

L. N. Akhtulova, O. V. Dezhurova, D. A. Gryuner
Management of discrepancies in serial technological processes of the industrial enterprise

In the article methodical aspects of management by discrepancies in serial technological process on the basis of the differentiated approach to identification of risks are considered.

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

ELECTRICAL AND POWER ENGINEERING

V. L. Yusha, G. I. Chernov
The analysis of internal combustion engine with vapor and gas working mixture for ideal thermodynamics cycle efficiency

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

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

V. R. Vedruchenko, N. V. Zhdanov, E. V. Makarova, M. V. Kulkov
Development of processes of ignition and heat exchange by radiation in unshielded hot-water furnace

The analysis of influencing factors on development of processes of ignition of a fuel flame in unshielded hot-water furnace is carried out. The introduced technical solutions on intensification of heat exchange in the furnace are proved by the calculation procedure of gas temperature at the exit of furnace and additional radiators taking into account.

Keywords: ignition and heat exchange, the boiler, a radiator

V. R. Vedruchenko, N. V. Zhdanov, E. E. Zhdanova, E. S. Lazarev
Peculiarities of choosing burners for boilers of low performance

The basic requirements to burners for boiler installations and others heat generating and fuel burning devices are formulated.

Keywords: a burner, an atomizer, a flame, kinetic and diffused burning.

V. A. Burchevsky, L. V. Vladimirov, V. N. Goryunov, V. A. Oschepkov
Distance identification of failures in distributive networks
by standing wave method

This article considers identification of failures in distributive networks by standing wave method at line-to-ground short circuit in circuits of 6 to 35 kV. An example calculation of line intrinsic resonance frequency and plot graph of current distribution lengthwise line by the origin standing wares are given.

Keywords: identification of failures, standing wave method.

S. S. Girshin, A. A. Bybenchikov, V. N. Goryunov, A. A. Levchenko, E. V. Petrova
Temperature distribution analysis by sectioning
of self-bearing insulated wires

In the article the reasoning for accounting of temperature in the self-bearing insulated wires (SIW) is considered. Calculation of temperature distribution in a current carrying thread of wire SIW 3 is shown. Calculation of distribution of temperature in wire insulation with and without dielectric losses is considered.

Keywords: SIW, temperature distribution, a current carrying vein, isolation.

S. S. Girshin, A. A. Bybenchikov, E. V. Petrova, V. N. Goryunov
Mathematical model of power losses in the insulated wires taking temperature into account

In the article expressions for temperature calculation of the external surface of insulation wire depending on really accepted assumptions can be used for determination of wire temperature and power losses per the unit of length are obtained. The ways of finding of heat-returning factor by radiation are proposed. Variants of a finding of heat-returning factor by convection according to the admissible thermal mode are considered by numerical criteria of the similarity theory.

Keywords: the isolated wire, model, capacity losses, convection, radiation, temperature.

A. S. Nikishkin
Control of modes of determined chaos in nonlinear electrical power systems

The existence of chaotic modes NEES as additional in-service state even then when there are stable equilibrium points is identified. The chaotic mode may be terminated by sudden loss of stability of synchronous generators and, hence, NEES as a whole.
Chaotic modes especially complicate the work of synchronous generators as chaotic modes have a broadband spectrum of frequencies and may induce harmonics of a current and the voltage being dangerous to synchronous generator operation.
With the help of control actions it is possible to carry out compulsory synchronization and the conclusion from the chaotic mode of synchronous generators.

Keywords: the determined chaos, management of chaotic fluctuations, nonlinear electrical power system.

A. P. Popov, A. O. Chugulev
Surface effect analysis in conductors of various sections by Elcut software

The results of electromagnetic processes modeling in various section form conductors are presented in Elcut software. Conclusions about the influence of current frequency to a conductors characteristics according to the section form and environmental variables are made (conductors surrounded by dielectric and conductors located in iron core slot are examined).

Keywords: skin effect, complex impedance, computer simulation.

A. P. Popov, A. A. Moiseenko
Computer modeling of induction contactless speed sensor's magnetic field and computation of its output signal

The authors propose the computation of output signal of induction sensor used in different devices for measurement of torque and rotational speed. The results of computer modeling of sensor magnetic field in Elcut software environment and sensor's output signal computation for different engine's rotational speeds considering nonlinearity of the magnetization curve of materials are obtained. This computation enables to estimate the signal's changing depending on engine's rotational speed and sensor geometry (shaft, ferromagnetic cog, permanent magnet and stand).

Keywords: induction sensor, magnetic field, Elcut software environment.

E. G. Andreeva, A. J. Kovalev
Decomposition of mechanical characteristics of asynchronous electrical motor by Kloss formula

In the article mechanical characteristics of an asynchronous electric motor obtained by Kloss formula for a multiloop equivalent circuit of the motor are investigated.

Keywords: mechanical characteristics, Kloss formula, asynchronous electrical motor.

INSTRUMENT ENGINEERING, METROLOGY AND INFORMATION-MEASURING EQUIPMENT AND SYSTEMS

A. A. Novikov, Ya. B. Shuster, D. A. Negrov.
To the design peculiarities of ultrasonic piezo-ceramic converter of half-wave length

It is discovered that the layout of piezo elements in the ultrasonic vibrator of longitudinal type with regard to the node of fluctuating velocity of longitudinal fluctuation distribution considerably affects the amplitude of the vibrator operating end-facing. It is shown, that the most effective layout of piezo elements is its location within a quarter-wave-length segment with a reflector facing when the node of fluctuating velocity is at the beginning (at the edge) of the reflector facing. The effect of both piezo material thickness and frequency is specified.

Keywords: piezo elements, the node of fluctuating velocity, the ultrasonic frequency, piezo vibrator.

V. P. Kismereschkin, G. N. Lobova, A. V. Dudarev, D. V. Ritter
Microwave heating by the field of surface waveguide

The suggested method is for heating organic industrial objects by means of surface waveguide. The advantages of this method such as using low-powered microwave frequency generators without frequency and phase synchronization and using microwave frequency radiators are considered. These advantages give opportunity to design devices with required allocation, minimize steel intensity and decrease cost.

Keywords: microwave heating, surface waveguide, field distribution, boundary radius, radiator, waveguide termination

A. V. Maystrenko, A. A. Svetlakov
Multidot method of digital differentiation of signals

The original method of digital differentiation of signals intended for using in real time is synthesized. The method is based on application multidot estimation of unknown sizes on their experimental measurements and pseudo-return matrixes. Some results of analytical research, illustration its serviceability and suitability for using in control systems of various purpose working in the mode of real time are given.

Keywords: system of the linear algebraic equations, digital differentiation.

V. Yu. Kobenko
The fractal identification scale

The results of research of an opportunity of creation of the serial identification scale based on fractal properties of studied processes and phenomena are submitted. Fractal properties of objects are properties which are inherent as the whole, and its parts. The identification scale is based on a method which reveals and measures fractal properties of processes that allows to rank them by these properties. Technologies fractal identification scales allow to solve problems of automatic recognition, objective classification and identification of processes and the phenomena.
Keywords: fractal, recognition, identification, classification, signal, scale.

S. N. Chizhma
Up-to-date requirements for electrical energy quality monitoring devices in railway power supply systems

Up-to-date requirements for electric energy quality parameters monitoring devices were formulated. They are based on analysis of current condition of electric power counters, quality parameters monitoring devices and event registrars, and characteristic features of power supply systems on railway transport.

Keywords: electric energy quality parameters monitoring devices. electric energy devices, power supply systems on railway transport .

S. N Chizhma, R. I. Gazizov
Electrical signal parameters analysis in power supply systems

The recommendations of using foreign standard documentation for controlling high frequency harmonics and inter-harmonics of electrical signal were given based on the analysis of railroad power supply system peculiarities. This analysis establishes the qualitative relation between these specificities and parameters and spectral composition of the electric signal.

Keywords: electrical signal parameters, railroad power supply systems.

A. D. Byalik
The analysis of basic parameters of reflectometric amplitude fiber optic pressure sensor transfer characteristics

In the paper basic parameters of reflectometric amplitude fiber optic pressure sensor transfer characteristics are discussed and fiber optic sensor construction influence on these parameters are studied.

Keywords: fiber optic sensors, pressure, transfer characteristics.

A. V. Bubnov, T. A. Bubnova, M. V. Gokova, V. L. Fedorov
Logical comparator for phase-lock systems

In the article the implementation of the multifunctional logical comparator and its elements allowing to increase the operational speed and the operating reliability of the phase-lock systems in the wide range of the regulation is offered.

Keywords: phase lock, logical comparator, pulse frequency-phase discriminator.

M. I. Ryaguzov
The equation of material balance on the base of regression model of primary oil processing unit AVT-6

In the article the methods for forming regression models of the primary oil processing unit AVT-6 on the base statistical data are described. Also the equation of material balance formed on the base developed models takes place.

Keywords: regression models, plant unit AVT-6, material balance, algorism, methodology coordination of the material balance.

I. N. Krasnokutsky
Power switching for exterior lighting by means of video surveillance system

In the article integration of the system of video surveillance into the automated switching control system for exterior lighting providing visual control of remote equipment by a supervisor is considered. The algorithms of video signal data acquisition for taking decisions on the time of turning on/off external illumination are stated.

Keywords: the automated control system of illumination, the photometric gauge, natural light exposure, brightness, video observation system.

Yu. I. Matyash, D. N. Shloma
The method of diagnosing of technical condition of the carload conditioner

The article is devoted to the question of diagnosing of the technical condition of system of cooling of the carload conditioners used in modern carriages. In the article the analysis of the reasons of occurrence of malfunctions is resulted, the lacks of existing methods of search of malfunctions are described, advantages of the offered method of diagnosing are formulated, and also the algorithm of the diagnosing is specified, allowing to define type, character and the location of the malfunctions occurred in the system of cooling of the carload conditioner. On the basis of an offered method of diagnosing it is expedient to develop diagnostics complexes of steam refrigerators of any configurations. The results of the present work have wide application in a number of the enterprises of the Omsk region specializing in the area of repair and refrigerating machinery service, in particular, "Cryogenic engineering" and passenger carload Omsk depot LVCHD-1.

Keywords: the carload conditioner, cooling system, malfunction, diagnosing, the temperature gauge.

INFORMATION TECHNOLOGIES

V. I. Potapov
About choosing optimal algorithm of control and diagnostics for neural system on the basis of the generalized informational criterion of optimization

The solution for choosing the optimal algorithm of control and diagnostics for a neural system using the informational criteria of system state evaluation is resulted.

Keywords: optimization, neural nets, algorithm, control, diagnostics, informational criteria.

A. L. Agafonov, V. I. Razumov, V. P. Sizikov
Simulation modelling language on the base of TDIS providing quality of automation

Starting with specific characters, formal grammars and taking into account TDIS the simulation modelling language is set out. The approach to formal grammar application has been used. The approach is close to the conception of genetically attributed structures. The knowledge of DIS-technology is formed where the automation quality is bound with analysis of the system completeness.

Keywords: automation, DIS-technology, imitation, TDIS.

Yu. N. Klikushin
The Wurf-classification of the genetic texts

The algorithm of the Genetic Texts Classification is described. There are two classification parameters. The first is the Text Long and the second is the Wurf.

Keywords: Genetic Texts Classification, Wurf, Text Long

D. N. Matvienko
Innovative redesign methodologies for legacy software

Abilities of using Agile methodologies for redesign of legacy "waterfall" software are described. Description of Scrum methodology are presented. Special features of technical documentation for TDD project are described.

Keywords: Methodology, Agile development, Legacy code, TDD, Scrum.

V. A. Nikonov
Information value of the instrumental measurement in the area of sub-surface probing

The paper covers methods of ultra wide band location of the objects beyond reach from the position of achievement of maximum resolving capacity and accuracy.
We suggest using phase component of returned signal in order to define geometric and physical parameters of the objects.

Keywords: sub-surface radiolocation, ultra wide band probing, space-time processing, form reconstruction, phase spectrum

E. Yu. Mashinskaya
Modeling of algorithm of placing of video cameras into an object perimeter

Optimizing placement of cameras at the facility is presented. The object is a limited area at one side - the buildings, at the other side- unlimited space (e.g., beach). We use two methods to optimize the placement of video cameras - vector geometry and interpolated cubic splines to resolve the task of the lowest coverage.

Keywords: video controlling, approximation, interpolation, vector geometry, the interpolated cubic splines, the task of the lowest coverage.

RADIO ENGINEERING AND COMMUNICATION

I. D. Zolotarev, V. A. Berezovsky
Phase direction finders with heterodyne tuning system for multiple target

The operation of phase direction finder realized by schema with frequency substitution of heterodyne oscillator for monitoring and bearing of signal sources in high-frequency band is researched. The phase direction finder (PDF) for functioning in intricate conditions of multiple objective work is observed. Application of the matrix method for consideration of direction finder work in indicated conditions assures fast and visual submission of signal at the outlet through combination components produced by interaction of multiple objective signals during its passing through nonlinear elements of PDF.

Keywords: phase direction finder, sources of emitation of signal copies, signal matrix, boresight characteristic.

I. D. Zolotarev, V. A. Berezovsky
Phase direction finders under conditions of electronic warfare

The operation of phase direction finder (PDF) for monitoring and bearing of signal sources in high-frequency band is observed. The PDF for functioning in conditions of electronic warfare is researched. For analysis in this conditions of canonical schema of PDF with variable-frequency heterodyne oscillator it became necessary to work out the matrix method. Elements corresponding to self combination frequencies are on the main diagonal of matrix, other elements of matrix are reflecting mutual cross product at the output of phase discriminator. Applying to the work in high-frequency band of PDF with common heterodyne oscillator the solutions providing independent location of space diverse sources of imitation of signal copies are proposed.

Keywords: phase direction finder, sources of imitation of signal copies, signal matrix, bore sight characteristic.

V. L. Khazan, D. V. Fedosov, D. A. Korneev
Short wave channel transmitting reliability and receiving ability at spread frequency and in distant regions

This article examines frequency and regional receiving ability for short wave channel. As it is generally known there are many methods of diversity techniques in communication channel. Diversity methods are important in fighting with fading and channel interference.
Accurate estimation of power advantage in short wave channel with frequency and regional diversity is presented.

E. I. Algazin, A. P. Kovalevsky, V. B. Malinkin
The invariant system with non-linear processing of signals

The invariant system of processing of information based on square-law characterized non-linear processing has been synthesized. Non-linear processing consists of 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 non-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.

E. D. Bychkov
Models of communication channel and estimation of test code word in the system of monitoring of complex system on the basis of the fuzzy sets theory

In the work the mathematical model of a communication channel and new approach of estimation of code test words in the system of monitoring and diagnostics of conditions of elements of a telecommunication network on the basis of the theory of fuzzy sets are considered.

A. N. Lepetaev, D. N. Klypin
Modeling of inductive coupled coils for transcutaneous wireless power transmission

The present work represents theoretical investigations of different wireless power and data transmission methods in biological systems of human being activity.
The results of investigations are: optimal wireless power transmission method is specified as inductive; optimal power transmission frequency range fixing as 0,1...1 MHz; mathematical model of transcutaneous wireless power transmission system and the tool for its design is developed.