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# SUMMARY

## SCIENCE AND EDUCATION

**N. V. Kaygorodtseva, O. A. Bondarev**  
**Higher Education Institution instructor – is a profession**

The article covers some professional features of an instructor activity in a higher education institution and recommendations are given for unskilled instructors. The recommendations will introduce unskilled instructors into educational and teaching process of a higher educational institution and develop their professional skills.

Keywords: instructor, profession, teaching process, professional skills.

**L. V. Letova**  
**The concept of quality of higher education: problems and ways of development**

This article considers problems of the higher school in the high-light modernization of Russian education. The special attention is paid to the questions of personality formation, adaptation of the level of training of students to the demands of the economy in different regions of Russia.

Keywords: quality of education, personality formation, orientation to the demands of regional economy.

**V. A. Arzhanov, A. I. Odinets, V. V. Pshenichnikova**  
**Information technologies as major factor for qualitative training of professionals**

The influence of information technologies on the improvement of training and implementation of innovative education programs is discussed.

Keywords: education, innovation, information, technology, competence.

**G. N. Lobova**  
**SADT-methodology impact on functional invariant activity**

In this paper shows how SADT methodology has impact on functional invariant activity, including cognitive, changing, value-oriented, communicative and aesthetic activity. An experiment proves that the students using SADT methodology for a general activity develop their personal qualities in a attributive activities of an functional invariant.

Keywords: activity, SADT methodology

## PHYSICS AND MATHEMATICS

**V. K. Fedorov**  
**Fundamental space-time and energy relations: mathematical and physical aspects of theoretical model of the origin and development of the Universe**

In the offered work the theoretical hypothesis about the origin of the Universe, representing an alternative model to the Big Bang one is considered. In the basis of the offered hypothesis the concept of discreteness of physical Space and Time is laid. It is the concept that is immediately bound to the model of creation of the Universe in a mode of the determined chaos with its subsequent forced synchronization as a result of which there was possible an occurrence of ranked material structures. The analysis of fundamental existential and the energy relations describing creation and evolution of the Universe is carried out.

Keywords: Big Bang, chaos, step-type behavior, continuity, time quantum, space quantum.

## ENGINEERING GEOMETRY AND COMPUTER GRAPHICS

**Panchuk K. L., Volkov V. Ya.**  
**Modeling line spaces by conformity of metric structures**

Elliptic plane models of line metric space are considered. The construction of models is made on the basis of Kotelnikov-Study simulation and an establishment of conformity of line space metric structures and its models. The plane models developed

possess novelty and exchange geometric operation with line space objects by operations with their images on a plane.

Keywords: line metric space, geometrical model, an elliptic plane

**O. B. Ilyasova, V. Ya. Volkov**  
**Structural and analytical representation of linear hyper surfaces of four-dimensional space**

A new algorithm of the formalized analytical representation of hyper surfaces of space  $E_4$  by means of methods of the theory of parameterization and computing geometry that allows to set a sort of the interpolating or approximating equation to define a number of experimental values for its deduction.

Keywords: linear hypersurfaces, structural and analytical representation

**L. K. Kulikov**  
**S-plane setting**

In a multidimensional space setting a s-plane by two planes of smaller dimension and other ways of setting are considered. The number of possible determinants for the plane of the given kind is obtained. That gives information about the plane setting at the initial stage of modeling. The possibility of transition from one determinant of the plane to another is shown.

Keywords: space, s-plane, a determinant.

**E. E. Shmulenkova, F. N. Pritykin**  
**Analysis and optimization of parameter values influencing the efficiency of the graphic constructions checking system**

In the article the results of analysis and optimization of values of various parameters influencing the efficiency of the use of graphic constructions checking system (GCCS) in educational process are presented. Numerical values of the parameters are obtained. The graphs and diagrams describing interrelation of these parameters are made.

Keywords: descriptive geometry, system of a checking of graphic constructions (SCGC), the control of knowledge, optimization of parameters.

## MECHANICAL AND THEORETICAL ENGINEERING

**Vad. I. Surikov, S. V. Danilov, Yu. V. Kuznetsova, B. T. Gryaznov, A. G. Turovets**  
**The electron-electron and electron-phonon interactions in the metal phase of vanadium dioxide**

The experimental analysis results on the temperature dependencies of heat capacity, magnetic susceptibility and electric resistance in the vicinities of the vanadium dioxide metal-dielectric phase transition are presented. The obtained results of analysis allows, in particular, to estimate the parameters of the electron-electron (Stoner's coefficient) and electron-phonon interaction and the electron density near the Fermi level in the metal phase of pure and alloy vanadium dioxide.

Keywords: vanadium dioxide, heat capacity, electric (al) resistance, magnetic susceptibility.

**V. I. Surikov, S. V. Danilov, B. T. Gryaznov**  
**The physical properties of pure and alloy vanadium trioxide**

The experimental study results on the temperature dependencies of heat capacity, magnetic susceptibility and electric resistance in the vicinities of the vanadium trioxide metal-dielectric phase transition are presented. The obtained results of analysis allow to determine the parameters of the phase transition and to draw a conclusion on its nature.

Keywords: vanadium trioxide, heat capacity, electric (al) resistance, magnetic susceptibility.

**Yu. K. Mashkov, A. S. Ruban, B. T. Gryaznov, A. A. Baybarsky**  
**The analysis of mechanical and tribotechnical properties of**

**PCM and structure depending on thermal processes under conditions of friction**

The results on definition of mechanical and tribotechnical properties of polymer composites with different concentration of cryptocrystalline graphite are considering. The influence of concentration of cryptocrystalline graphite on the coefficient of friction and temperature are revealed. The optimal concentration filler of various conditions of friction are defined.

Keywords: Composite, coefficient of friction, temperature of friction, tribosystem.

**D. A. Negrov, E. N. Eremin**

**The influence of parameters of ultrasonic pressing on mechanical and triboengineering qualities of polymeric composite materials**

In the paper the influence of parameters of ultrasonic pressing (an amplitude of oscillation of the punch, time and pressure) on mechanical and tribotechnical properties of the composite material on the basis of polymeric composite materials is observed. It is shown, that ultrasonic pressing leads to rise in ultimate strength, decreasing the wear rate and coefficient of friction of the material tested.

Keywords: ultrasonic pressing, polymeric composite materials, an ultimate strength, wear rate, coefficient of friction.

**E. A. Rogachev, Val. I. Surikov, V. A. Fedoruk**

**The analysis of cluster structures of modeling two-component composites**

In the work the computer model intended for modeling of processes of structurization and the analysis of cluster structure of composite materials is offered. On the basis of the model values of the threshold percolation, critical exponent percolation, and also fractal dimensions for a two-dimensional and three-dimensional lattice of two types of structures are obtained. The distinction in elastic properties of composite structure depends on features of cluster structures.

Keywords: composite, modeling, cluster, percolation.

**V. S. Kushner, M. G. Storchak, A. N. Zhavnerov, A. A. Krutko**  
**Definition of the valid mechanical properties of materials after considerable deformations under adiabatic conditions**

The changes of mechanical properties in materials during cutting process are investigated. It is shown that it is reasonable to use the maximal yield strength of a material to characterize its mechanical properties. It is obtained by equalizing intensity of strengthening and softening during material deformation under adiabatic behavior.

Keywords: mechanical properties, cutting, maximum yield stress.

**Melnik S. V., Korzunin Yu. K., Goloshapov G. A., Rashupkin V. P.**

**Analysis of abrasive wear of steel-to-steel friction pair, steel-to-bronze friction pair using Litol-24 lubrication with additions**

The article deals with the studying of the additions' influence of different nature upon wear-preventive lubrication characteristics of Litol-24 during sliding in the conditions of the abrasive wear of different alloy surfaces.

Keywords: plastic lubrication, additions, friction sliding, abrasive wear

**Kadikova M. B., Gatelyuk O. V.**

**Quantitative classification of a metal on granularity for structure analysis by ultrasonic method**

It is experimentally confirmed that logarithmic-normal law of distribution of grains of metal on the sizes with factor of correlation  $r$  is equal to 0,99. The mathematical expressions connecting the visible image metallographic section to the numerical characteristics logarithmic-normal distribution of grains of metal doing quantitative classification on granularity for an ultrasonic method are offered. The meanings of an average diameter and root-mean-square deviation for division homogeneous, heterogeneous, fine-grain and coarse-grain of structures are determined.

Keywords: structure of metal, granularity, ultrasonic method.

**Balakin P. D., Zgonnik I. P.**

**The geometrical-kinematic and power correlation in a mechanical flat-belt drive autovariator**

The recommended values of rigidity of the elastic element in a control chain by preset law of change of the gear ratio adequately dependent on variable external loading are established.

Keywords: autovariator, loading, parity, rigidity, change.

**Balakin P. D., Mihaylik O. S.**

**The synthesis of a control chain of a tooth gear with automatic change of rigidity of gear engagement**

It is presented elastic and static model of a cog wheel of modified design, with adaptive properties, the model defines the law of change of the cog firmness and the characteristic of the inbuilt elastic element of in the control chain with automatic change of rigidity of gearing depending on changing of external loading.

Keywords: cogwheel, rigidity, gearing, chain, management

**O. S. Lomova, S. M. Lomov, S. E. Zakharov**

**The calculation of radial displacement of a detail at free rotation in bench centers under various conditions of contacting of the bases**

The calculation of displacement of the detail axis at free rotation in the bench centers taking into account various contact interaction of the detail of and the machine tool bench centers surface is presented in the article. The detail rotation in the bench centers is difficult spatial motion of its axis. On the basis of Euler's equations of spatial co-ordinates calculation of displacement it is calculated the interrelation between different kinds of contacting tapered surfaces of the detail with the bench centers of the machine tool and the trajectory of displacement of the detail axis  $l$  in the bench centers is obtained. Simultaneously, the values of displacement of the axis at constant and variable points of contact are defined.

Keywords: rotation, detail, bench centre, displacement, axis.

**Yu. A. Mozhaev**

**The analysis of areas of instability of pendulum with additional internal degrees of freedom**

In this paper we consider the problem of stability of the dynamic equilibrium of physical inverted pendulum with two additional internal degrees of freedom. The results of the calculation of the zones of instability in the case of vertical vibration point suspension. The method is applied to researchers of «direct division of motions».

Keywords: vibration, dynamic equilibrium, stability, slow and fast forces, vibration strength, slow and fast motion.

**Z. N. Sokolovskiy, I. A. Demetrienko**

**The study of stability and durability of straight rods under complicated loading**

There is a methodology of operative assessment of carrying ability of thin-walled straight rods under complicated loading by criterion of durability and stability. This methodology is recommended to calculate structure elements of constructions and building designs.

Keywords: cores, durability, stability, critical load.

**A. P. Morgunov, S. A. Snatovich**

**The research of deterioration an electrode - the tool at electroerosive processing of titanic alloy VT 5**

The carried out research on wear of an electrode - the tool for processing of titanic alloy VT 5 in various environments shows that the wear rate of the electrode depends, first of all from the energy of the impulse and force of the current. Formation of more precise contour occurs to certain value of dimensional deterioration of the tool.

Keywords: geometrical parameters; wear of electrode - the tool; electroerosive processing.

**A. P. Morgunov, S. A. Snatovich**

**The research of processing productivity depending on the impulse duration, heights of cutting of titanic alloy VT 5**

The carried out research on processing of titanic alloy VT 5 by machine tools has shown, that, first of all, the productivity of machine tool depends on duration of the impulse and cutting height (height of a processed surface).

Keywords: electroerosive processing; productivity at electroerosive processing; the electric category;

**K. V. Syzrantseva**

**Experiment-calculated method of forecasting of industrial products durability under operational conditions**

The paper considers experiment-calculated method of equivalent number of deforming cycles and equivalent stress of pipeline under operational condition, when its internal pressure and temperature are varying in accordance with the law of random values. This method is described by example of diagnostics of reliability maintenance and forecasting of pipeline resource according to fatigue durability of pipeline.

Keywords: pipeline, resource forecasting, fatigue durability, equivalent stress, random external load

**V. G. Shakhov, S. N. Chizhma, I. M. Drozdov**

**The analysis of physical phenomena when cleaning different surfaces by "dry ice" technology**

The cleaning technology for different surfaces by «dry ice» technology is examined. The model of the treatment process is made. The analysis of the model is made. The distance to the object of cleaning is found that provides the highest effectiveness of the cleaning.

Keywords: dry ice, cleaning, encounter, modeling, attenuation, probability

**A. E. Voronov**

**The comparative analysis of dynamic properties of two systems of drives of the roll printing machines**

The article is devoted the analysis of the dynamic phenomena in two basic different circuit designs of drives of rotary printing machines.

Keywords: dynamics, drives, individual electric motors, printing device.

**S. N. Nurakov, A. K. Tomashets, V. V. Savinkin**

**Improving the quality of plasma spraying by development of plasmatron construction**

In the given article some articles of improvement of the spraying quality surface repaired using highly concentrated plasma energy sources are described. In particularly, the impact of plasmatron constructive peculiarities on the adhesion value, powder composition and its consumption as well as the reduction of coating porosity is analyzed.

Keywords: multicomponent, nozzle, an electromagnetic prism, adhesion.

**Yu. A. Buryan, V. N. Sorokin, E. N. Eremin**

**Hydroacoustic borehole radiator with an extreme control system**

In the article the rod type hydrodynamic radiator with an extreme control system located in a borehole at the level of the oil reservoir is considered.

Keywords: borehole, hydrodynamic radiator, resonance frequency, fluid flow, extreme control system.

**R. N. Khamitov**

**The influence of gas thermodynamic parameters in pneumatic shock-absorber volumes on the efficiency of its performance**

In the article parameters of an overall performance of the operated pneumatic shock-absorber on the basis of its thermodynamic ideal and real cycles are obtained. Thermodynamic interpretation of the factors of energy dispersion and smoothness of its motion is given.

Keywords: a thermodynamic cycle, factor of energy dispersion, factor of smoothness of a course.

**A. B. Korchagin, R. N. Khamitov, G. S. Averyanov**

**Hydrodynamic vibrating stand**

It is offered with the expanded 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. The expansion of functionality is provided because hydrodynamic vibrating stand has drives of frequency change of fluctuations within the range 0 ... 20 Hz, changes amplitude of fluctuations within the range 0 ... 120 mm and the device for imitation of shock influence with shock absorption system.

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

**L. O. Schtripling, M. G. Popov**

**Enhancement of manufacture of complex case-shaped parts**

Lacks of the existing system of manufacture are considered at production of complex case-shaped parts. The examples of modern processing machine tools and the flexible industrial system are resulted, allowing to raise the production efficiency of case-shaped parts. Recommendations about the structure change of manufacturing enterprise raising its performance are given.

Keyword: preproduction, CALS – technology, machining center, basic part

**V. N. Klimov**

**Closed mathematical model of turboprop engine**

This article about definition of the closure equation of the mathematical model which describes work process of a turboprop engine and allows to calculate its characteristics.

Keywords: turboprop engine, mathematical model of the turboprop engine, characteristics of the turboprop engine

**V. Yu. Tetter, I. V. Fedorov, V. G. Shakhov**

**Support of information integrity in vibrodiagnostics**

There is a problem of vibrodiagnostics results reliability improvement. The algorithms of support of vibrodiagnostics results integrity were developed. This algorithms were implemented in software. Usage of this algorithms should improve vibrodiagnostic results reliability.

Keywords: vibration, diagnostics, etalon, spectra, defect, correlation.

**I. S. Vavilov**

**A flying vehicle with air cushion: problems of stability**

Air cushion aircraft control is possible to compare with piloting of an air plane. The pilot has to pay attention to such parameters like the roll and pitch. Increasing the pitch can lead to such negative phenomenon as striking the aircraft cockpit against the basic surface. Such dangerous cases could happen at high speed and rough basic surface, for example, on the rough water surface. In this case the thrust of engine is enough to increase pitch and strike the aircraft against the surface. In the worst it leads to traumas among passengers or the aircraft crew.

Keywords: thrust, air cushion, pitch, wing, pressure, "digging".

**A. G. Mikhailov, D. S. Romanenko**

**The mechanism of burning of liquid fuel**

In the article the mechanism of burning of a mobile drop of liquid fuel is considered. The equation of motion and the expression describing the processes of heat and mass transfer on the border of liquid to gas phases is presented.

Keywords: liquid fuel, drop, burning, dispersion.

**A. G. Mikhailov, S. V. Terebilov**

**Intensification heat transfer in fire chambers of small boilers**

Intensification of convective problems by a component of heat transfer in fire chambers of small boilers are considered. Different kinds of ribbing surfaces are offered.

Keywords: burning, a fire chamber, heat transfer, convective, developed surfaces.

**V. V. Lukyanchenko**

**Energy and ecological criterion for a comprehensive evaluation of the efficiency of butane-propane gas usage in diesel engines**

The article offers a criterion, which is the comprehensive indicator of efficiency of diesel engine performance using butane-propane gas and its blends with diesel fuel and additives. This criterion takes into account both the efficiency indicators and the ecological aspects of this fuel usage in the form of harmful engine emissions.

Keywords: diesel engine, butane-propane gas, combustion heat, toxicity liquefaction coefficient

**E. I. Skovorodnikov, A. V. Chulkov,  
V. A. Mikhhev, S. I. Akhmetov**  
**Development of mathematical model for operating modes and fuel consumption of main diesel locomotives**

The article provides a brief analysis of main diesel locomotives operating modes. The possibility of applying mathematical modeling for forming the diesel locomotives operating modes and calculation specific fuel consumption in account of the concrete conditions at the given range is shown.

Keywords: the main diesel locomotive, power-plants operating modes, fuel consumption on traction, mathematical model.

**E. I. Skovorodnikov, Yu. B. Grishina,  
S. I. Akhmetov, A. M. Minitaeva**  
**The mathematical simulation of ecological characteristics of diesel engines**

The article considers simulation using factors influencing technological, economic and environmental characteristics of diesel engines.

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

**B. V. Zhuravsky, D. N. Znoenko**  
**Adaptation of electrical power supply system of a automobile to the driving mode**

The opportunity of transformation of some kinetic energy of a car during deceleration into electric energy, by introduction the modified system electrical power supply and implementation of its operational algorithm is considered.

Keywords: accumulator battery, internal combustion engine, system of electrical power supply of a car, voltage adjuster.

**A. V. Chernyakov, V. S. Koval, A. V. Sukhov**  
**Experimental research of the operation of two cylindrical shaking sieves with oblong apertures askew to the plane of their motion**

The article is devoted to the research of grain separation process on two cylindrical shaking sieves with the increased orientated ability carried out by the planned experiment. The dependences of the qualitative characteristic of the sieve body operation - division ability - are obtained. They revealed the rational structure and operational mode parameters of the sieve body which accelerate the process of separation.

Keywords: grain cleaning, separation, sieve, orientation of a grain on sieve.

**A. L. Akhtulov, O. V. Dezhurova**  
**The mechanism providing safety of product**

The article is devoted to the problem of choosing of a method of product safety discussed in scientific literature. The author analyses standards containing the requirements to the system of management of product safety and the system of quality management. This analysis makes certain conclusion concerning the application of the known tools for the decision of the problem of product safety.

Keywords: product safety, safety management system, quality management system, HACCP system.

**L. N. Akhtulova, A. M. Surtaev**  
**The methods of quality management system's internal auditors competence assessment**

The internal auditors competence assessment of quality management systems is a base of adequate internal audits results ensuring. It is like an investigation of efficiency and efficiency

of quality management system. The authors are suggesting their own methods of internal auditors and candidates to auditors competence assessment, that forming prerequisites to creating a dynamical motivation system of internal auditors, based on criterions assessment.

Keywords: quality management system, internal audits, internal auditors, assessment, competence, criterions.

## ELECTRICAL AND POWER ENGINEERING

**Yu. Z. Kovalev, A. Yu. Kovalev,  
A. S. Solodyankin, E. Yu. Ryakhina**  
**Condition of matching of catalogue data under condition of physical application**

This article matches the asynchronous motor catalogue data under condition of physical application of mechanical characteristics used for T – shape replacement scheme with the consecutive magnetization loop.

Keywords: asynchronous motors, replacement scheme, catalogue data.

**A. I. Miroshnik, A. S. Solodyankin**  
**The analysis of asynchronous electric drive connection to non-nominal voltage**

It is offered the analysis of conditions of asynchronous electric drive connection to voltage and frequency of electric circuits differed from nominal.

Keywords: electric drive, momentum, current, starting, nominal, maximal

**A. V. Ded**  
**Definition of losses of capacity in distributive networks taking into account the influence of asymmetrical loading**

The influence of asymmetrical loading on electrical supply systems is considered. The additional losses of capacity in the systems of electrical supply occurred in elements are analyzed under asymmetry of currents and voltages. The results of the experimental research of quality indicators of electrical energy in the system of electrical supply feeding consumers with asymmetrical loading are given.

Keywords: modes of power supply systems, asymmetrical loading, capacity and electric power losses, quality of the electric power.

**A. G. Lyutarevich**  
**The analysis of electromagnetic conditions in system «power network – active filter harmonics»**

The article is devoted to questions of electromagnetic compatibility of active filter harmonics as technical means. In the article the basic terms and definitions in the field of electromagnetic compatibility with reference to the active filter harmonics are considered. Also the attention is paid to electromagnetic conditions in the system «power network – active filter harmonics». In the conclusion, the ways of restriction of level of distortion, generated by the active filter harmonics, are presented.

Keywords: electromagnetic compatibility, active filter harmonics.

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

**Yu. N. Klikushin, V. Yu. Kobenko**  
**Identification measurements fundamentals**

The basic concepts and definitions of identification measurements (IM) of signals are considered. Identification measurements estimate the form of signals quantitatively. The basic tools of IM are serial identification scales. IM includes technologies of measurement, database technologies and technologies of decisions making to solve tasks of interactive and automatic recognition of signals, including their objective classification and identification.

Keywords: recognition, identification, classification, signal, measurement.

**A. A. Kuznetsov, O. B. Meshkova**  
**Determination of integrity indicators and ability of material composition examination**

The task of determination of integrity indicators and ability of material composition examination has been considered, by means of probability alpha and beta error minimization, and process capability measure computing. The obtained algorithm has been proposed to atomic emission spectral analysis for providing its continuous accuracy control, by means of accuracy parameters and quality process index monitoring and introducing their calculated values into the analysis results.

Keywords: examination, materials quantity composition, integrity, alpha and beta error probability.

**E. D. Skutin, E. M. Budanova, L. N. Oleynik,**  
**A. G. Nelin, E. I. Mozgovoy**  
**Polymeric gas-sensitive materials in multi-sensor analyzers for quality of automotive fuels**

In the article the basic criteria of selection of sensor for multi-sensor analyzers of quality of automotive fuels are considered. The comparison of characteristics of three types of sensors fabricated by using metal oxides, conducting polymers and carbon black polymer composites is carried out. The main attention is paid to the ways of expansion of opportunities of analytical systems applying hybrid arrays and addition of new dimensions in space of analytical signals. The influence of selectivity and redundancy of sensor systems on reliability of the obtained analytical information is discussed.

Keywords: automotive fuel, analyte, gas sensor, electronic nose, nanomaterial.

## INFORMATION TECHNOLOGIES

**Potapov V. I.**  
**Reliability optimization for homogeneous neural network hardware redundancy problem**

There are methods of three reliability optimization of homogeneous neural nets with "static" reservation hardware redundancy problems solving and two problems of redundancy optimization of neural nets with "dynamic" reservation.

Keywords: reliability optimization, neural nets, reservation.

**A. V. Nikonov**  
**System engineering and architectural synthesis of the subsystem of information gathering, processing and transfer of geographically-distributed production complex**

The article covers methods of architectural synthesis of the subsystem of information gathering and processing with decentralized live-data processing. The article also provides the solution of system synthesis task, taking into consideration complex automation of manufacturing processes within a public data system.

Keywords: system synthesis, subsystem of information gathering, geographically-distributed production complex

**V. N. Zadorozhnyj**  
**About quality of random number generator**

The problem of quality of random number generator in programming languages is discussed. A convergence measure is developed for estimation of mathematical expectation. The proposed methods are based on the simplified analysis of the obtained values. The case of dependent tests is taken into consideration.

Keywords: testing of random number generator, statistical modeling.

**V. N. Zadorozhnyj, E. S. Ershov**  
**Gradient method and program of optimization for queuing networks**

A new effective analytical-simulation optimization method of nonmarkovian networks with queues is offered. The program of the method implementation in the environment of AnyLogic 6 is carried out. The speed of convergence and accuracy of the method are experimentally estimated. Practical recommendations about application of the method are given.

Keywords: network with queues, analytical-simulation modeling.

**O. Z. Is'yanov**  
**Optimization of a control system for comfort conditions using fuzzy logic**

Climate control systems provide comfortable conditions for living and industrial premises. When develop algorithms of control for such systems it is necessary to take into account unclear character of requirements of people to the comfortable parameters of microclimate, and common interconnection between parameters of microclimate (so the comfort temperature will depend on humidity in an apartment and the rate of air circulation). Therefore the optimum will be systems of automatic control with fuzzy-control rather than ones with hard set parameters taking into account unclear character of requirements of people to the parameters of microclimate.

Keywords: microclimate, comfort, fuzzy control, fuzzy logic, temperature, linguistic variable.

## RADIO ENGINEERING AND COMMUNICATION

**Yu. N. Klikushin**  
**The identification method for signal classification**

The method of classification procedures is described. This method is founded on the signal identification measurements. Tree classification procedures are described in examples.

Keywords: identification measurements, classification method, signal trees

**E. I. Algazin, A. P. Kovalevsky,**  
**E. A. Kasatkina, V. B. Malinkin**  
**The invariant system with adaptive stationary Gauss noise and the correlative function of the general kind, and the internal noise of generator equipment**

The invariant system of information processing based on synchronous detection by the full correlation of the noise readings has been considered.

By calculation the parameters of such kind of system it is admitted that the readings of the sub-carrier are interfered with the adaptive noise whose readings are correlated with each other and also a bearing signal of the synchronous detector is interfered with the readings of the white noise.

The quantitative estimation of the operation of such kind of system is compared with the quantitative indexes of the known invariant system by non-correlativeness of the noise readings.

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

**A. A. Lavrukhin, K. V. Lobov**  
**Efficient algorithms of digital signal processing for magnetotelluric sounding**

The article contains the methods developed for digital processing of magnetotelluric data. Modification of the methods is suggested to increase efficiency and quality of geological survey. The general algorithm of primary data processing is described.

Keywords: magnetotelluric sounding, signal, noise, autoregression, filter, algorithm.

**V. A. Arzhanov**  
**The comparative estimation of blocking effect of resonant amplifiers of preselector**

The comparative estimation of effect of blocking in radio receivers is given using resonant amplifiers of preselector with various active elements.

Keywords: nonlinear effects, blocking, blocking factor, a dynamic range.

## CHEMICAL TECHNOLOGY. CHEMICAL INDUSTRY

**I. V. Anikeeva, V. N. Anikeev, Yu. N. Nikitin**  
**Modeling of structure and calculation of morphological and electrical characteristics of furnace carbon-black**

The paper considers the possibility of modeling the structure of heating carbon black and gives examples of the calculation

formulas to control the quality and production technology for the morphological and electrical characteristics.

Keywords: carbon black, structure, aggregate, agglomerate, model, calculation formula.

**Yu. N. Nikitin, I. V. Anikeeva, V. N. Anikeev**

**On the problem of modeling the structure of rubber, reinforced furnace carbon-black**

In this paper, the analysis of contemporary representations of the reinforcement of elastomers by carbon-black, the structure of rubber and the role of carbon-black in its formation, as well as recent works on modeling the structure and the prediction of rubber quality.

Keywords: rubber, carbon-black, structure, model.

**N. D. Demidenko, L. V. Kulagina**

**Numerical simulation of technological modes in tube furnaces**

The paper suggests mathematical model for stationary and dynamic modes of the technological furnaces as objects possessing distributed parameters. During the investigation the static and transient characteristics of the industrial furnaces are analyzed. The corresponding boundary problems are formulated.

Keywords: mathematic simulation, control of systems with distributed parameters, optimization, heat-mass exchange

**PUBLISHING  
AND PRINTING ART**

**O. V. Tokar, M. A. Zilbergleit, S. N. Litunov**

**Estimation of legibility of a font on a material of the official document**

In the article the results of estimation of legibility of some fonts by a method of measurement of time of reading, and also results of their discernability on the basis of non-distinguished conditional labels are resulted. On the basis of the data about time of reading and geometrical parameters of fonts the equation of regress for estimation of legibility of the fonts used for registration of texts in official documents is obtained.

Keywords: font, legibility, discernability

**L. A. Shichko, O. V. Tokar, M. A. Zilbergleit, S. N. Litunov**

**Visual estimation of font design a method of semantic differential**

In the article the results of evaluation of font design of modern signboards in Minsk are represented by the method of semantic differential and methods of images recognition, the technique of research is stated, the generated semantic space and association of objects in groups with similar attributes is described.

Keywords: font, design, advertising, methods of images recognition



МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РФ  
ПРАВИТЕЛЬСТВО ОМСКОЙ ОБЛАСТИ  
ГОУ ВПО «ОМСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»  
ОМСКИЙ НАУЧНЫЙ ЦЕНТР СО РАН  
ИНСТИТУТ ПРОБЛЕМ ПЕРЕРАБОТКИ УГЛЕВОДОРОДОВ СО РАН

ПЕРВОЕ ИНФОРМАЦИОННОЕ СООБЩЕНИЕ

*Уважаемые коллеги!*

*Приглашаем вас принять участие в научно-методической конференции  
«НОРМАТИВНОЕ ОБЕСПЕЧЕНИЕ И ПРАКТИКА ОРГАНИЗАЦИЙ ОМСКОЙ ОБЛАСТИ  
ПО ВВЕДЕНИЮ В ХОЗЯЙСТВЕННЫЙ ОБОРОТ ОБЪЕКТОВ ИНТЕЛЛЕКТУАЛЬНОЙ  
СОБСТВЕННОСТИ, СОЗДАНЫХ ЗА СЧЁТ СРЕДСТВ ФЕДЕРАЛЬНОГО БЮДЖЕТА»,  
которая состоится 10 – 12 ноября 2009 года  
в Омском государственном техническом университете*

Конференция проводится с целью повышения эффективности осуществления методического, технологического и организационного обеспечения работ, выполняемых в рамках мероприятия 3.2 Федеральной целевой программы «Развитие инфраструктуры наноиндустрии в Российской Федерации на 2008 – 2010 годы.

Научные направления конференции:

- *Вузовская наука – в решении задач инновационного развития региона*
- *Нормативная база управления интеллектуальной собственностью*
- *Пути вовлечения в гражданский оборот результатов научно-технической деятельности*
- *Нанотехнологии и перспективы их развития*

***Возможны дополнения направлений в рамках объявленной тематики***

***Организационный комитет***

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К открытию конференции планируется издать сборник материалов конференции, в который будут включены статьи, оформленные строго в соответствии с предъявляемыми требованиями.

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Желающие принять участие в работе конференции должны в срок **до 15 октября 2009 года** направить следующие материалы:

- заявку на участие в конференции;
- печатный и электронный варианты доклада в объёме 5 – 6 страниц.

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