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SUMMARY

JUBILEES

V. I. Potapov
To the forties anniversary of the chair «Informatics and Computer Technology» of Omsk State Technical University

This article is devoted to the short historical information about foundation and development of the chair «Informatics and Computer Technology». The author gives the basic results of scientific research of the chair's staff and its activity. The rewards which the staff was awarded for study and research is pointed in this article.

Keywords: historical information, chair, scientific research, rewards.

ENGINEERING GEOMETRY AND COMPUTER GRAPHICS

A. A. Lyashkov
Orthogonal projection of surface using specified parametric equations

The work is a study of orthogonal projection of surface using specified parametric equations and the coordinate plane. There are necessary and sufficient conditions for the existence of the contour line and its features. It defines necessary and sufficient condition of conditional extremes in curves generated by the intersection of the specified surface planes parallel to the coordinate axis containing orthogonal projection. These results are used to calculate the path points and sketch surface numerical methods that do not require the use of differential characteristics of the surface.

Keywords: contour line surface, profile surface, line folding, point Assembly.

Y. I. Bityukov, V. A. Kalinin, Yu. I. Deniskin, P. V. Miroshnichenko
Finding the optimal path for threads positioner in the process of winding of fibrous composite materials

This article is focused on the development of a mathematical model of one of the most important methods for producing products from composite materials - winding by continuous fibers in the direction of the force. In the article it is considered the problem of finding the optimal trajectory and the law of the motion of folding mechanism of the machine with numerical control in making products from fibrous composites by the winding method in the view of restrictions on allowable position of the folding mechanism, tension of strings of a tape, speed of movement of the tape.

Keywords: winding, fibrous composite material, dynamic programming, Bellman function, folding mechanism of the winding machine

PHYSICAL AND MATHEMATICAL SCIENCE

A. M. Zav'yalov, M. A. Zav'yalov, E. A. Bedrin
The analyses of stability of phase transition border coordinate at freezing and thawing of soil active layer

The stability of phase transition border coordinate is analyzed at geocryological processes in soil active layer. It is established that the considered point is asymptotically steady.

Keywords: asymptotic stability; Stefan's condition; coordinate of phase transition border; soils of active layer.

A. A. Kolokolov, T. M. Orlova
Development and analysis of discrete optimization models for computer-aided design of some class of complex products

We consider discrete optimization models with logical, resource and other constraints for computer-aided design of a class of a light industry products. The new formulations of the problems and integer linear programming models, an approach to the construction of algorithms to solve them are presented.

Keywords: computer-aided design, discrete optimization, integer programming, logical formula.

A. V. Myshlyavtsev, M. D. Myshlyavtseva
The width of strip used in transfer matrix method and temperature effect on critical phenomena in reaction proceeding via Langmuir-Hinshelwood mechanism

In this paper the effect of the width of strip used in transfer matrix method and temperature on multiplicity domain of steady states and self-sustained oscillations of reaction rate proceeding via the Langmuir-Hinshelwood mechanism has been studied in the case of irreversible adsorption. A lattice

gas model on a square lattice is considered as a model of adsorbed overlayer. The transfer matrix method has been used to calculate right hand parts of kinetic equations. It is shown the increasing of the strip width and temperature does not qualitatively change and simplifies multiplicity domain of steady states, respectively.

Keywords: lateral interactions, transfer matrix method, multiplicity of steady states, self-sustained oscillations.

A. A. Magazev
Symmetry of the Klein-Fock equation in external electromagnetic field

The algebraic structure of symmetry operators for Klein-Fock equation on non-Riemannian manifolds with movements in the presence of an external electromagnetic field is investigated in the article. It is shown, that in case of electromagnetic field tensor to be invariant, the resulting algebra represents the one-dimensional central expansion of algebra of initial group of motions. Several non-trivial examples are considered.

Keywords: Klein-Fock equation, symmetry operator, Lie group, Lie algebra.

S. S. Akimenko, V. A. Gorbunov, A. V. Myshlyavtsev, M. D. Myshlyavtseva, V. F. Fefelov
«Devil staircase» of phase transitions in primitive model of adsorption of dimers

The primitive model of multicenter adsorption on the hexagonal lattice is constructed and studied, taking into account different orientations of molecules with respect to surface. The model is studied using the transfer-matrix method. A method for the transformation of a hexagonal lattice to a square lattice is proposed. This greatly simplifies the calculations. Interesting and fairly rare phenomenon is found: the transition from the phase with only horizontally oriented dimers to the phase with only vertically oriented dimers goes through infinite sequence of ordered structures.

Keywords: transfer-matrix method, adsorption, dimer, devil staircase, modeling.

L. D. Afanas'eva, A. A. Kolokolov
Development and analysis of algorithm for solving some forming production groups problems

Forming production groups problem is investigated considering interpersonal relations and other conditions. Discrete optimization model is created, branch and bound algorithm for solving this problem is proposed. The theoretical and experimental analysis of the algorithm is done.

Keywords: operations research, discrete optimization, integer programming, assignment problem, branch and bound method, production group.

P. A. Batrakov, A. V. Mayer, V. A. Simakhin
One-dimensional nonparametric generator with account the aprioristic information

In the work the algorithm of the one-dimensional nonparametric generator generating a random variable taking into account the aprioristic information of a various kind is considered. Modeling of algorithm of the generator is done and the obtained data is checked by criteria of the data consent.

Keywords: nonparametric generator, aprioristic information, random variable, distribution function

A. G. Luk'yanov
Development and research of heuristic algorithms for solving planning manufacture problems of complex products

In the given work statement of planning small-scale manufacture problem of complex products and meeting model of integer linear programming is resulted. New heuristic algorithm for the problem solution is offered: a variant of «greedy» algorithm G2, local search algorithm LS2 and ant colony algorithm AC2. Computing experiments have shown high efficiency of the specified algorithms. The most accurate algorithm becomes the algorithm of ant colony AC2.

Keywords: planning manufacture problem, model of integer linear programming, heuristic algorithms.

CHEMICAL SCIENCE

I. A. Kirovskaya, I. Yu. Kasatova, A. V. Yurieva, V. I. Surikov, Yu. K. Mashkov, V. F. Surovikin, P. E. Nor, Yu. I. Matyash
Production and analysis of new materials and catalysts on the basis of system CdTe-ZnS

On the developed technology firm solutions of replacement of system CdTe-ZnS — new materials and catalysts for the first time are obtained. The surface chemical compound, the property acid-cores powdery and

film samples in restoration reaction of dioxide nitrogen by ammonia are studied. The most active and low-temperature catalyst of neutralisation NO_2 of structure $(\text{CdTe})_{0,04}(\text{ZnS})_{0,96}$ is found.

Keywords: technology, firm solutions, catalysts, the acid-cores of property of surface, neutralisation dioxide nitrogen.

I. A. Kirovskaya, S. O. Podgorny, A. V. Yurieva, S. A. Korneyev, E. N. Eryomin, V. F. Surovikin, Yu. I. Matyash, I. Yu. Kasatova
Nanomaterials for sensor controls-gauges on the basis of system ZnSe-CdTe. Adsorption and electrophysical research

Adsorption and electro-physical research (measurements superficial electric conductivity) is conducted on nanofilm samples of semiconductors of system ZnSe-CdTe in various gas environments (CO , O_2 , $\text{CO} + \text{O}_2$). The nature, mechanism, laws of adsorption, presence and character of change electric conductivity in the conditions of chemical adsorption, analogy in laws of change electric conductivity and adsorption characteristics are established. Practical recommendations about application the studied adsorbents as materials of high-sensitivity and selective sensor controls gauges on a microimpurity oxide carbon (II) are given.

Keywords: semiconductors, nanofilm, adsorption, superficial electric conductivity, the mechanism and laws, sensor controls-gauges.

I. A. Kirovskaya, O. T. Timoshenko, A. V. Yurieva, S. A. Korneyev, V. F. Surovikin, Yu. I. Matyash, P. E. Nor, E. O. Karpova
Production, physical and chemical analysis of new absorbent by developed technology

The technology is developed, for the first time firm solutions of system $\text{InP} - \text{CdS}$ are produced in the form of powders and films. The structure of surface, volume and adsorption properties of the firm solutions in relation to carbonic oxide is obtained. The most active are revealed adsorbents offered as materials for sensor controls-gauges of ecological appointment.

Keywords: technology, firm solutions, adsorbents, surface structure, adsorption properties, sensor controls-gauges.

MECHANICAL AND THEORETICAL ENGINEERING

P. D. Balakin, A. H. Shamutdinov
Structure of mechanism of spatial manipulator

The proposed structure of a spatial manipulator is a general type with six independent partial motions including the independence of the sequence of their execution in order to simplify the motion control system. If unification is achieved, one forward motion consists of two opposing rotations. Uniform kinematic relations are found.

Keywords: manipulator, mobility, driving the partial motions.

A. P. Morgunov, E. Yu. Chkhetiani
The influence of technological system rigid factor to the machining precision of thin-walled variable-section flange

The article is devoted to the problems arising at processin of thin-walled ring details. The factors influencing accuracy of processing are considered. The calculation is resulted allowing to define dependence of the angle of deformation and axial motion on the forces applied to technological system.

Keywords: technological system, precision, thin-walled details.

I. M. Kovenskiy, V. N. Kuskov, A. N. Venediktov, I. A. Venediktova, A. G. Obukhov
Technological parameters of stabilizing treatment of electrodeposited coating

Diffusion processes of migration and annihilation of spot defects in electrodeposited coating after electrical deposition are considered. The influence of a vacancy concentration on properties of coats is determined. The processing conditions for stabilizing of properties of coats in the process of exploitation are defined.

Keywords: electrodeposited coating, annealing, stabilization of properties.

S. A. Kornilovich
Increasing contact hardness of toothed wheel surface during manufacturing and repairing

The main reasons of toothed wheel changing in gear boxes of the tractors «Kirovets» during its maintenance and repair are described in this article. The data about initial hardness effecting operating life time of toothed wheels before maximum surface destruction are shown. Technological methods preventing spalling of tooth surface are presented.

Keywords: peening, re-peening, surface spalling of metal, pitting, abrasive wear, residual tensions, rest stage, resource, maximum hardness.

Yu. K. Mashkov
Thermodynamics of physical and chemical processes in the metal-to-polymeric tribosystems

Analysis of physical and chemical processes of friction in polymeric composite materials (PCM) and the influence to thermodynamical state of the tribosystem is resulted.

Keywords: metal-to-polymeric tribosystem, thermodynamics, triboelectrical processes, tribochemical processes, heat processes.

Yu. K. Mashkov, M. Yu. Baybaratskaya, A. A. Baybaratskiy, A. V. Syrieva, T. A. Kalinina, A. M. Sizikov
Synthesis of hydrocarbon modifiers and analysis of effect on tribotechnical properties of polymer nanocomposites

In the article physical and chemical processes of hydrocarbon modifiers' synthesis are considered, chemical composition and structure of hydrocarbon modifiers as well as their influence on wear resistance of polymer composites are analyzed.

Keywords: anodic microdischarge, hydrocarbon emulsion, nanomodifier, polymeric composite material

V. A. Kononov, V. I. Neldner, D. A. Ustinov
The influence of parameters of the tool on forming a pipe part with rather thick wall at cold compression by conic matrix

Compression of pipe parts in matrixes with funnel angles in 300, 450 and 600 is analyzed. The forms of loss of stability and corresponding to them parameters of initial thick-walled pipe parts and the tools are revealed. It is received quantitative evaluation of a thickening of the wall of the swaged pipes for a number of standard sizes of the pipe parts deformed with factors of compression 1,25, 1,40, 1,55. Also the character and size of change of length of the compressed samples are established. Resulted data may be used for technological processes of punching of products by cold compression under «open» scheme.

Keywords: compression, thick-walled pipe, a conic matrix.

O. S. Lomova
The control of positional deviations the axes holes in cylindrical fitting parts of hydraulic units

The article describes a measuring device designed to control positional deviations of the axes holes of small diameter parts located on the cylindrical surface. The measuring device reduces the complex operations of control parts for hydraulic cylinders, it increases the accuracy and reliability, and generally improving the accuracy of manufacture, reliability and durability of the hydraulic units.

Keywords: measurement accuracy, the hydraulic units, the cylindrical surface, the grooves and holes, the positional deviations.

D. A. Negrov, E. N. Eryomin
The increase of amplification and frequency stability of ultrasonic waveguide system factor

The combined tool is developed for ultrasonic pressing which raises four times frequency stability systems, provides effective and steady work of ultrasonic installation as a whole and increases strength of a composite material by 10 %.

Keywords: the ultrasonic tool, a polymeric composite material, PTFE base, an indicator of frequency stability.

V. A. Penner, A. P. Morgunov
Workshop of washing and diagnostics of pump-compressor pipes and bars for pumps

The project of workshop of washing and diagnostics of pump-compressor pipes and bars for pumps is presented. The structure of the basic and auxiliary equipment is defined. The block diagram on preparation of pump-compressor pipes and bars for reuse is developed.

Keywords: pump-compressor pipe, diagnostics.

I. V. Revina, V. B. Ozhereliev
Optimization of parameters of equipment

The influence of the parameters of the lathe tool on the level of noise in the operator workplace is presented. The model of the process is developed and extremum function is identified.

Keywords: noise, optimization, processing parameters, lathe tool.

A. P. Tsybalenko

The accuracy of processing of details on surface and end face grinding machine tools

The problems of grinding accuracy of details on metal-cutting equipment are considered at form shaping on simultaneously processed surfaces. The errors arising during technological process of grinding of piston rings are found. The measuring system improving technical and economic indicators - high accuracy of measurement of height of rings and high degree of automation of control by machine tool adjustment is developed.

Keywords: accuracy, management of grinding process, deterioration, adjustable impulse.

M. Ya. Shvets, V. V. Akimov, A. F. Mishurov

The technology of repair of copper alloy components by method of thermodiffusion saturation

This article is devoted to the technology of repair of bronze cylindrical bushings, swinging unit of hydraulic pump by the method of thermodiffusion saturation.

Keywords: restoration, bronze bush, cylinder rock, thermodiffusion saturation.

A. A. Kozhushko

Variant of rheological parities of isothermal viscoelastic deformation of elastomers

In the work the variant of the rheological parities describing processes of isothermal viscoelastic deformation of elastomers is offered. Rheological parities are received using the four-element model of mechanical behavior and substantive provisions of the linear theory viscoelasticity. It is of interest for enterprises producing elastomers and general mechanical rubber goods.

Keywords: rheological parities, viscoelasticity, deformation, elastomer.

A. V. Shiler

Effect of grinding on rail surface

Geometric parameters of rail track before and after grinding of rails are measured. Evaluation of the rail with different operating time after grinding is done.

Keywords: grinding rails, grinding efficiency, resource rail.

V. V. Shiler

The method for calculation of spatial deformation mode of flexible bandage

The method for calculation of spatial deformation mode of flexible brace that rotates independently of the new design wheel set is developed.

Keywords: method of calculation, the spatial deformation mode, the flexible band, independent rotation, wheel set.

M. I. Biserikan, Yu. A. Ivanova, V. V. Ivanov

Perfection of technology of repair of rolling stock wheels with fatigue defects

In the article the influence of technological hereditary roughness arising due to not effective technology of repair on the process of contact interaction stress and deformed condition in the system «wheel-to-rail» is considered. The technological method is presented providing necessary indicators of quality of the wheel surface and reducing values of contact stress in the contact point.

Keywords: wheel, defect, durability, turning, the technological roughness.

A. V. Gasan, S. E. Dadayan

The influence of forces of inertia and forces of pressure of gases on tear and wear of piston group of tank diesel engine B-84

The article is devoted to analysis of influence of inertia forces and forces of pressure of gases on the form and character of tear and wear of details of piston group of tank diesel engine B-84.

Keywords: a diesel engine, piston group, tear and wear, forces of inertia, force of pressure of gases.

V. Yu. Usikov, A. V. Keller, S. V. Ushnurtsev

The method of partial solution for power distribution between driving wheels of automobile base chassis

The results of calculation of additional losses of power are resulted at motion of automobile base chassis of type owing to irrational distribution of power.

Keywords: automobile base chassis, differential drive, capacity, method of the partial decision.

I. P. Aistov, V. D. Smimov

The mathematical model of elastic drive for pistons of microcompressors for cryogenic refrigerators and pneumatic systems

The mathematical model of elastic drive for the pistons of microcompressors for cryogenic refrigerators and pneumatic systems made as a cylinder with spring coil pressure, which can be used for different spring gears with spiral cylinder springs including springs with open turns.

Keywords: Elastic elements, microcompressor, helical coil spring, spring coil pressure, piston machine

A. A. Gladenko, Yu. K. Mashkov, N. A. Prokudina

The increase of reliability and durability of equipment for transportation of hydrocarbons

The analytic investigation results of the influence of constructive parameters and petroleum crude properties on friction conditions and leakproofness of oil transfer pump face seals are considered.

Keywords: face seals, modeling, oil leaks, face backlash, temperature, factor of hydraulic loading.

A. N. Kabakov, S. V. Korneyev, Yu. K. Mashkov, V. N. Sorokin

The increase of reliability and life time of rotors of axial piston compressors and pneumatic engines

The present article is devoted to the problem of increase of lifetime and reliability of work of axial-piston compressors and pneumatic engines in electrical power, cryogenic and refrigerating machinery in the space-rocket engineering, transport and also in mechanical engineering, mining and other industries.

Keywords: axial-piston compressor, axial-piston pneumatic engine, sinusoidal path of rotor.

V. I. Karagusov, A. A. Gladenko, V. D. Galdin, A. V. Bubnov, S. N. Litunov

Application of rare-earth alloys in regenerators of low temperature cooling systems

The usage of rare-earth materials in cooling systems improves their characteristics considerably. The offered method of calculation of thermal capacity of rare-earth alloys on the basis of experimental data of thermal capacity of pure rare-earth metals allows to expand application of rare-earth alloys in low temperature cooling systems.

Keywords: rare-earth metals, alloys, regenerator, low temperature cooling systems.

V. E. Shcherba, G. A. Nesterenko, A. K. Kuzhbanov, B. A. Kalaschnikov, V. N. Blinov, A. M. Paramonov, S. M. Ovcharenko, M. P. Altyntsev, V. I. Surikov, V. I. Baryshev
Calculation of processes of compression and extension of piston pump with gas damper

In the work three design procedures of processes of compression and expansion of the piston pump with a gas damper are offered. Analytical and engineering methods of calculation, and also a method of mathematical modeling of working processes of the pump are considered. At modeling of working processes the basic fundamental laws of preservation of weight and energy are used.

Keywords: pump of the three-dimensional action, worker processes, mathematical modeling, gas damper.

A. V. Grigoriev, V. E. Shcherba, B. A. Kalashnikov, V. N. Blinov, A. M. Paramonov, S. M. Ovcharenko, M. P. Altyntsev, V. I. Surikov, V. I. Baryshev

Experimental research of spur gear rotor pump

This paper describes the experimental setup of the hydraulic circuit diagrams of the pressure sensors. The technique of measuring the torque on the drive shaft of the pump is considered. The results of these studies are presented.

Keywords: rotor pump, experiment, experimental setup.

V. V. Vyatkov, D. V. Karelin, S. A. Kovalev, T. V. Tomilina
Solution for reduction of secondary losses in cascade blades of gas turbine

The paper presents the results of the automated system to gain optimal losses in end surfaces turbine nozzle blade. It is shown that asymmetric end surfaces profiling may lead to the increased efficiency of turbine.

Keywords: aircraft engine, gas turbine, the nozzle blade, the secondary flows.

A. G. Mikhailov, S. A. Korneyev, P. A. Batrakov, S. V. Terebilov
The study of radiationally-convective heat transfer of high-temperature gas flow in channel

Taking into account the recommendations of the literature designed and constructed an experimental installation to simulate and study complex processes of heat exchange between the high-temperature gas stream and the cold surface of the channel are given. It describes the main characteristics of the instruments and equipment.

Keywords: experimental installation, the complex heat transfer, shielded thermo-couple, thermocouple.

V. A. Maksimenko, V. S. Evdokimov, A. A. Gladenko, A. A. Novikov, V. D. Galdin
The system of soil freezing on the basis of vapor compression and natural circulation loops

At present the oil and gas industry is developing rapidly. So, there is a need for qualitative transportation of raw materials. In this regard, there is a demand for devices implementing thermal stabilization of soils and grounds pipelines.

Keywords: combined cooling device of seasonal frozen soil dosed for construction of compressor stations in the permafrost, temperature regulation of the soil, the natural cooling, freezing zone of soil.

A. N. Fot, V. S. Evdokimov, I. P. Aistov, V. D. Galdin, V. N. Kostukov
The automatic monitoring with remote access to refrigeration and compressor systems

Refrigeration and compressor equipment, despite the high level of reliability of modern systems cannot operate indefinitely without failure. At present, more widely used in refrigeration systems are monitoring and management of the equipment with aid of computers.

Keywords: cascade refrigeration unit, the monitoring system, temperature sensor, temperature sensor, thermocouple, strain-gage transducers.

ELECTRICAL AND POWER ENGINEERING

A. V. Bubnov, A. M. Daynovich
Parametric optimization of adjuster in digital phase locking motor drive

This article is about features of using digital adjuster in phase locking motor drive. It has analyzed the influence of digital adjuster parameters on dynamic characteristics of motor drive. Computer parameter optimization is done to find maximum speed mode of motor drive.

Keywords: phase locking motor drive, digital adjuster, maximum speed mode.

A. Kh. Musin, S. A. Khudorozhko, E. N. Eryomin
The vulnerability assessment of power supply process to consumers by using a random search

We propose a method of vulnerability assessment process of power supply for cities. The measure of vulnerability is the size of emergency power for the unfulfilled consumers for the fixed period of time. Determination of the power is calculated by a computer simulation in software application MatLab, which takes into account the probabilistic nature of the place and time of the failure at the known power circuit and power supply load nodes.

Keywords: vulnerability, risk, power, city, accident damage.

A. M. Paramonov, A. V. Kushnarenko, V. N. Goryunov, I. A. Kholmyanskiy
Optimization of lining parameters of rotary kilns

We consider the problem of optimization of multilayer lining of rotary kilns consisting of layers of different thickness and made of materials with different physical and chemical properties. A solution is obtained, which allows to determine the most cost-effective wall thickness at the location of the optimal sequence of refractory and insulating materials. The proposed algorithm makes it possible to evaluate various combinations of the parameters of the multilayer lining and optimizes it for the given constraints.

Keywords: lining, optimization, refractory materials, insulation materials, rotary kiln.

A. P. Popov, K. A. Klimentko
Calculation of signal of transformer current probe for measurement of current by geometrical sizes and parameters of signal winding

In the article the results of calculation of magnetic stream signals are received in magnetic core surrounded with a short-circuited ring by software complex Elcut. The transformer sensor for measurement current and comparison of these signals with experimental data is presented.

Keywords: transformer sensor for measurement current, calculation of electromagnetic field, experiment, Elcut.

A. P. Popov, V. Yu. Sysolyatin
Digital device for measurement of electricity amount for study galvanic and chemistry processes

It is considered a digital measuring device intended to control a current value of amount of electricity generated by a chemical source of current with a simultaneous registration of current voltage on terminals of current chemical source, and automatic switching-off of loading at the achievement of the set the level of voltage to which the chemical source of current should be discharged. In the article functional and basic electric schemes of the device, as well as the algorithm of the program functioning are considered.

Keywords: amount electricity, digital device.

V. K. Fedorov, S. V. Biryukov, V. T. Cheremisin, L. G. Polyntsev
Features of origin of chaotic transitive electromechanical processes in power systems

The possibility of occurrence of the complex self-excited electromechanical fluctuations in nonlinear electrical power system is considered. Necessary and sufficient conditions of occurrence and identification of modes of determined chaos in transitive electromechanical processes of nonlinear electrical power systems are offered.

Keywords: electromechanical transients, stability, chaos, bifurcations.

S. S. Girshin, E. V. Petrova, R. K. Romanovskiy, V. V. Kharlamov
Features a choice of means of reactive power compensation during energy audits of power consumption objects

It is considered the problem of reactive power compensation as energy-saving measures in the networks of consumers. It is proposed formulas for calculating the optimal power compensating devices in a network node according to different criteria and it was justified the expediency of the choice of power over a range of economic values. It describes the main features of the choice of compensating devices in conjunction with other measures to reduce losses energy.

Keywords: reactive power, compensating devices, energy losses, resistance.

A. G. Mikhailov, V. N. Goryunov, S. A. Korneyev, I. A. Kholmyanskiy, N. E. Korotkova, S. V. Terebilov
Modeling of processes in the liquid injection furnace boilers

There is simulation of liquid injection into the furnace of boilers in this paper. The authors describe the equations of motion of water droplets, and expressions that describe the processes of heat and mass transfer at the interface liquid-gas interface.

Keywords: drop, combustion, fuel injection, boiler furnace.

V. V. Nechaev, Yu. V. Babkin, A. V. Kolunin, A. E. Sizov
Method of diagnosing of car generator system

The paper presents a method of diagnosing of car generator using oscilloscope device.

Keywords: oscilloscope device, Lissajous figures, generator set.

K. I. Nikitin, N. M. Zaytseva, M. Ya. Kletsel, K. S. Taronov, O. A. Sidorov
The protection of lines detecting short circuits behind low-power transformers of its line branches

The device of the backup guard of links having required responsivity is offered at short-circuits behind transformers of branches. It analyzes a current difference of phases in the given moment, and in time 0,1 s up to it. It is shown, that with reduction of power of transformers of branches the responsivity of the guard to short-circuits rises.

Keywords: line, dead shorts, protection, sensitivity.

K. V. Khatsevskiy, Yu. M. Demchik, V. I. Kleutin, D. A. Zubanov, A. V. Bubnov, V. V. Kharlamov
Quality of electric power in electrical supply system

The analysis of existing devices for measurement of indicators of quality of the electric power and their basic characteristics is made. The influence of the poor-quality electric power between the seller and the buyer is considered. Ways of practical removal of a problem of quality of the electric power are resulted.

Keywords: quality of the electric power, electroconsumers, factor direct and return sequence, devices-analyzers.

S. Yu. Dolinger, C. V. Biryukov, R. K. Romanovskiy
Problems of active filtration of wave-current in four-wire three-phase network

This paper is devoted to the problem of power quality that draws more and more attention. Three schemes of active filters for a four-wire three-phase network are considered. The problem of voltage imbalance 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 management shoulders of the power bridge. That will allow to create simple and fast algorithm of management on the basis of the theory of instant capacity.

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

I. N. Krasnokutskiy, A. V. Bubnov, D. S. Osipov, E. V. Petrova
The analysis of natural illumination in power supply control system of lighting installations

In the article problems of natural illumination and control system of electrical power supply of lighting installations are considered. The algorithm exponential smoothing is offered. Results of experimental supervision are obtained by methods of spectral analysis.

Keywords: electrical supply system, the lighting installation, natural light exposure, exponential smoothing.

E. V. Petrova, N. V. Kirichenko, E. V. Ptitsyna, V. L. Yusha
Analysis of advantages of improved method for calculation of losses in electricity transmission air-lines at variation of currents of loading and weather conditions

In the article methods of calculation of losses of electrical energy in not isolated wires of air-lines of an electricity transmission are considered. The analysis of their applicability in respect of accuracy of modeling of temperature of current-carrying lines is carried out.

Keywords: bare wire, energy losses, temperature, wind, load.

INSTRUMENT ENGINEERING, METROLOGY AND INFORMATIONAL MEASURING SYSTEM

S. S. Kolmogorova, S. V. Biryukov
Design features of spherical sensor and its interaction with different sources of electrical fields

This article concerns design features of isotropic three-coordinate electrical induction spherical sensor of electrostatic field intensity. Results of modeling and analysis interaction sensor with fields of different sources are demonstrated.

Keywords: electrostatic field, intensity, spherical sensor, discontinuity of electric field.

S. Z. Ikhlov
Vibrating diagnostics by fractal analysis method

The results of investigation of the method of fractal analysis to classify the data obtained from the vibration sensor aircraft engine. Studies are conducted to explore the possibility of identifying signals using methods based on finding the fractal dimension of the cell and the height of the «irregularities» of the signal by ten points.

Keywords: vibration, diagnosis, identification, coefficient, dimension, signal, fractal.

A. V. Shakhov, A. A. Kuznetsov
Automatic detection of the basic type of analyzed materials in spectral analysis devices

The algorithm and software developed as results of the research are presented in this article. They identify various groups of materials by spectral analysis of metals and alloys. The use of the algorithm permits to

improve the accuracy and reliability by measuring of spectral line's intensities, and consequently the quantitative content of the impurity elements of unknown materials.

Keywords: the spectral analysis, the unknown materials, the reference spectra, fiducial lines, identification.

INFORMATIONAL TECHNOLOGY

A. V. Nikonov, S. V. Myasishchev
The analog model of process planning system

An approach to represent the computer-aided process planning system as an analog model is given. The article gives the model and algorithm for elaboration of technological solutions.

Keywords: model, automatic control system, adaptive system, decision box, process planning.

E. D. Bychkov, D. N. Kovalenko
Mathematical models of control systems of channel resource of multiservice system of telecommunication network

The algorithms of control channel resource queuing systems (QS), based on theories of teletraffic and fuzzy sets, provides a comparative analysis of algorithms for solving channel allocation of resources based on the theory of computational complexity.

Keywords: channel resource, priority, algorithm, fuzzy set, the fuzzy controller.

V. N. Zadorozhnyy, D. A. Tulubaev
Analysis of effectiveness of priority disciplines based on metamodel multistream queuing systems

Key parameters that determine the effectiveness of priority service disciplines are identified. A metamodel of priority queuing systems is used.

Keywords: complex control object, queuing system, price expectations, the metamodel.

E. A. Kaliberda, I. V. Fedotova
The analysis of requirements to software products with choice of method of testing on example web-oriented of appendices

The article considers the possibility of using qualitative methods of systems analysis for testing informational systems, identify the main requirements for them in accordance with GOST. As an example, an analysis of the popular web-site (vkontakte.ru), which is a special case of web-based IS. The variant of using the method of ranking method and the scores for testing web-oriented information system

Keywords: information system, testing, ranking method, the method scores.

M. A. Chizhik, M. N. Rasskazova, I. A. Sheveleva
Automation of design of optimal bags of clothes considering heat proofing qualities

The article is devoted to problems of automation of design of heat-proofing clothes with voluminous fillers. The factors which define heat-proofing qualities of voluminous clothes bags are named. The article provides the results of experimental research of air permeability of heat-proofing bags. A regression equation, which allows calculating the mass of down considering the air permeability of the bag, is obtained.

Keywords: automation, design, heat-proofing voluminous bag, down-feather filler, heat proofing qualities, air permeability.

A. Y. Vasin, V. N. Zadorozhnyy
The solution of one-dimensional bin-packing problem

Cutting and packing problems appear under various names in literature, e.g. cutting stock or trim loss problem, bin or strip packing problem, loading problem, nesting problem, knapsack problem etc. In this article it describes software for manufacturing stuff out of wood, plastic, metal etc. and provided means to automatically lay out parts minimizing waste.

Keywords: bin packing, one-dimensional packing, cutting and packing problem, cutting and packing algorithm.

A. I. Prudnikov, V. G. Shakhov
Features of ViPNet technology for securing information of corporate networks

In this article a brief description and analysis of local networks security are given. Problems of informational resources security of automated systems interacting with each other are defined. On the bases of the

analyses an efficient method of resources security is defined and complex mechanism of the method is described. Domestic technology and methods of its application are represented.

Keywords: virtual private networks, information security, threat, PKI, firewall, ViPNet technology.

D. A. Uryvskaya
Pseudo-holographic coding method and its applications to protection of the information problems

The method of pseudo-holographic coding of digital images is analyzed in application to protection of the information problem: coding of the data and protection of copyrights by digital watermarks.

Keywords: coding of digital images, a pseudo-hologram, correlation analysis, data protection, a digital watermark.

INFORMATION TECHNOLOGY IN EDUCATION

I. V. Zyuzko, M. S. Knyazeva, S. P. Shamets
All-Russian student competitions at Omsk State Technical University — 2011

The article publishes the results of the 3rd round of All-Russian student contests, and scientific-methodological workshop on exchange of experience in teaching of engineering disciplines with new, modern information technology.

Keywords: All-Russian student competitions, a workshop on exchange of experience, information technology, CAD.

K. A. Volkhin, T. A. Astakhova
The use of the information technologies in course of descriptive geometry

In this article we consider the alternatives of the use of the information technologies for descriptive geometry practical lessons organization and the influence of chosen alternative on the students' results.

Keywords: information technologies, descriptive geometry, graphical package.

K. A. Volkhin, O. B. Bolbat
The experience of using CAD systems in engineering graphics training of technical university students

This article describes the experience of using CAD systems in engineering graphics training of technical university students.

Keywords: CAD (computer aided design), graphics package, a graphics preparation.

T. G. Kostychenko
Training Master course «CAD systems in instrument engineering» at Tomsk Polytechnic University

Training Master course «CAD systems in instrument engineering» at Tomsk Polytechnic University is described.

Keywords: Master course, educational process, scientific work, CAD systems, practice.

I. I. Pervushina, N. V. Kaygorodtseva
Didactic and methodical requirements to development of electronic educational resources

The use of electronic learning resources in education is becoming a common practice, and every teacher wants to create an educational resource applying personal experience of teaching. But how do determine the type application and choose the means of information presenting? To help the developers there are offered major recommendations that take into account the didactic and methodical requirements.

Keywords: electronic book, electronic learning resources, electronic content, the methods of creation of electronic resources, pedagogical design.

N. V. Savinova
Characteristics of the computer workshop on «Machine parts and project fundamentals»

Nowadays better control of engineering knowledge, any kinds of research work and evaluation of competence is conducted with the help of information technologies.

Keywords: details of machines, computer workshop, testing, APM WinMachine.

V. A. Ettel, N. N. Krasnova, N. V. Mutovina, S. V. Romanov
Educational information technologies in Karaganda

This article deals with a high level of educational information technologies development. According to outside expert's assessment of Karaganda State Technical University, there is a wide use of case and remote teaching technologies at this university.

It should be stressed that the development of server and communication equipment for the last two years and a half provides the backgrounds for introducing TV-technologies in teaching process. As a result an Internet video-conference with a number of higher educational institutions of far and near abroad has been held, an international «Synergy» application is being realized at present. There has also been the debugging and verification of «Sony ipeal» video-conference communication system, which was installed by German and Austria Festocompany. Karaganda State Technical University provides all the facilities for higher qualification levels in the field of telecommunication information technologies. There are 27 courses and 19 seminars covering different higher technologies trends. It is reported that Karaganda State Technical University IT specialists try to do their best to increase the effectiveness of teaching. A new five-level innovation methodics has been developed. It is based on mixed teaching technology using TeachOn (<http://ldte.kstu.kz/teachon/>) port.

Keywords: Educational Information Technology, remote teaching technology, computer teaching, Web-technology, computer-aided information technology system

RADIO ENGINEERING AND COMMUNICATION

V. Yu. Kobenko
Modeling of identification addition operation at random signals distributions

The description, performance technology and formalization of addition operation of two random variables distributions in identification parameter space are presented.

Keywords: identification, identification measurements, intellectual systems, classification, random signal, order scale.

L. G. Rogulina
Computer-aided design of rectifying devices

The problem of computer-aided design of modern circuitry rectifying devices using the structural and parametric synthesis is considered. Simulation of dynamic modes by varying network parameters and load levels to minimize conducted interference on the part of rectifier device by selecting the circuit parameters of main circuit at the design stage of the device is done.

Keywords: rectifier device, conductive interference, simulation, design automation.

A. I. Tyumentsev, A. N. Yakovlev, I. M. Yasinskiy, V. A. Arzhanov
High selective bandpass LC-filter

A scheme for bandpass LC-filter using the T-shaped bridge-structure is considered. There are formulas for the elements of the original scheme and its modifications. The proof is used for equivalent transformation. It is shown that this scheme is second-class attenuation and contains the minimum number of inductors. It provides frequency response with high rectangularity, high rate of transmission suitable for practical values of the elements. The results of simulation of the filter with relative pass bandwidth of 3% are presented.

Keywords: relative pass bandwidth, equivalent transformations, transformation circuit elements, insertion loss, feasibility condition.

A. S. Molodtsov
Methods of increase of linearity of high-frequency power amplifiers

In the article modern ways of the linearity rising of radio-frequency amplifiers of power, their feature and the basic characteristics are observed.

Keywords: amplifier, linearization, predistortion, intermodulation, close loop.

V. A. Maystrenko, I. V. Ayutova
The software package analysis of personal data information systems of the university

The solution of the problem: bringing the informational systems of personal data to the university with legal requirements is developed. The use of the developed software at the stage of pre-study to optimize the solution of personal data protection in high school is analyzed.

Keywords: personal data, university, protection information.

**A. I. Tikhonov, I. I. Semenov, I. S. Bugaev, A. S. Parkhomenko,
V. V. Karachkov**
Principles of construction of energy-efficient discrete informational channels

The article is a comparative evaluation of the effectiveness of channels of discrete (digital) information on the criteria of energy costs on the transfer of units of information and bandwidth. It is shown that the minimum energy consumption and bandwidth utilization on the transfer of units of information reaches by the choice of type of manipulation and its base package.

Keywords: discrete, channels, information, bandwidth, manipulation, energy-efficient.

PUBLISHING. PRINTING INDUSTRY

L. G. Varepo, A. V. Panichkin
Numerical modeling of ink flow between rotating cylinders in the process of offset printing

This article presents the results of numerical simulation of ink flow between rotating cylinders in the area of print contact with the help of the finite-difference methods.

Keywords: printing paint, simulation, and the splitting of the paint layer

L. G. Varepo, A. S. Borisova, O. A. Kolozova
To the problem of contact area calculation for adhesion assessment

In the article the approaches to assessment of area adhesion contact at interaction of adhesive with substratum taking into account the surface real profile and porosity of substratum are presented.

Keywords: adhesive durability, area of contact, profile of surface.

O. V. Andreeva, I. I. Shakhova
Modernization of printing processes

Basic advantage in competitive struggle against electronic means of mass-media is the use of digital systems in control and management. Development of computer engineering allows to introduce new technologies in which electronic means will be addition to existing one.

Keywords: computer systems, standardization, densitometry, colorimetry, quality standards, ICC-profiles, uniform technological stream.

D. V. Pshenichnyy, I. A. Sysuev
Optimization of color reproduction in piezoelectric inkjet printing

A method of quality control of color reproduction printing systems is developed on the base of the piezoelectric jet printer. The method is based on the analysis of graded characteristics of printing system and entering proactive corrections on the prepress stage using the alternative software with possibility of control of printing head nozzles. The purpose of development is optimization of color reproduction printing systems, which include non-original ink sets and non-original printed materials.

Keywords: method of a piezoelectric inkjet printing, color reproduction, control of printing head nozzles, maps of the objective quality control, color correction, non-original consumable materials.

E. A. Voronov, I. S. Lebedev
Dynamic features of mismatch in printing pairs of drives with individual electrical motors

The article is devoted to the dynamic phenomena occurred in drives of rolled rotational printing machines where printers are driven by individual electrical motors.

Keywords: dynamics, drive, not-joining, printing device.

ТРЕБОВАНИЯ К ОФОРМЛЕНИЮ НАУЧНЫХ СТАТЕЙ, НАПРАВЛЯЕМЫХ В «ОМСКИЙ НАУЧНЫЙ ВЕСТНИК»

О содержании. Статья должна содержать только оригинальный материал, отражающий результаты исследований автора.

В аннотации (3–5 предложений), раскрывающей основное содержание статьи, и в заключительной части статьи необходимо отразить новизну результатов исследования, их практическую значимость. Просим авторов-омичей акцентировать полезность научных разработок для Омского региона.

О рассмотрении поступивших материалов. В редакции все поступившие статьи направляются на рецензирование. Высказанные замечания передаются автору. После доработки материалы вновь рассматривает рецензент, после чего принимается решение о направлении в печать.

Об оформлении. Статью необходимо набрать в текстовом редакторе Word (**кроме Word-2007 (*.docx)**) (шрифт — Times New Roman Cyr 14 пт, абзацный отступ — 0,5 см, межстрочный интервал — полуторный, **без переносов в словах**). Распечатать на бумаге форматом А4 (210×297 мм). Оригинал должен быть чистым, не согнутым, без ручных правок, страницы пронумерованы карандашом на обороте. Окончательный вариант статьи должен содержать не более 12 страниц (включая рисунки и таблицы). В редакцию необходимо предоставить распечатанный вариант статьи (с личной подписью автора/авторов) и электронную версию на любом из перечисленных носителей: CD-, DVD-дисках, запоминающем устройстве Flash drive (или отправить по электронной почте: **onv@omgtu.ru**).

Поля: сверху и снизу — по 2,5; слева и справа — по 2 см.

Заголовок. В верхнем левом углу листа проставляется УДК. Далее, по центру, печатается название статьи (**прописная буква только первая**), ниже — инициалы, фамилия автора (ов), строкой ниже — полное название организации (через запятую необходимо указать город, если этого не следует из названия). Ниже через строку помещаются текст аннотации и ключевые слова на русском языке.

Через строку **на английском языке** приводятся инициалы и фамилия автора (ов), название статьи, аннотация и ключевые слова. Еще через строку помещают основной текст статьи.

Ключевые слова на русском и английском языках располагают под соответствующей аннотацией. Слева печатается словосочетание «Ключевые слова: ...» или «Keywords: ...» и через запятую приводятся ключевые слова (не более шести слов/словосочетаний).

Если в тексте есть **примечания**, то после основного текста перед библиографическим списком набирается по центру заглавие «Примечания» и через строку помещаются тексты примечаний, пронумерованные числом в виде верхнего индекса (например, ¹) в порядке ссылок по тексту. **Ссылка на примечание** в основном тексте оформляется жирным шрифтом числом в виде верхнего индекса (например, ... модели.¹). Автоматическая нумерация примечаний не допускается.

Формулы. Простые внутрострочные и однострочные формулы должны быть набраны символами без использования специальных редакторов (допускается использование специальных символов из шрифтов Symbol, Greek Math Symbols, Math-PS, Math A, Mathematica BTT). Сложные и многострочные формулы должны быть **целиком** набраны в редакторе формул Microsoft Equation 2.0, 3.0. **Не допускается набор части формулы символами, а части — в редакторе формул.** В случаях, когда написание строчных и прописных букв совпадает и отличается только размером, в распечатанном варианте прописные буквы должны быть подчеркнуты простым карандашом двумя чертами снизу, строчные буквы — двумя чертами сверху. Индексы поясняются или дубли-

руются простым карандашом на полях. Если в тексте статьи формулы нумеруются, то эту нумерацию следует выполнить набором чисел. Автоматическая нумерация не допускается.

Библиографический список. В тексте должны содержаться ссылки на источники информации. Ниже основного текста (или текстов примечаний) печатается по центру заглавие «Библиографический список» и через строку помещается пронумерованный перечень источников в порядке ссылок по тексту в соответствии с действующими требованиями к библиографическому описанию. В одном пункте перечня следует указывать только один источник информации.

Ссылки на источники информации оформляются числами, заключенными в квадратные скобки (например, [1]). Библиографические описания оформляются в соответствии с ГОСТ 7.1-2003 и тщательно выверяются. Если ссылка на источник информации в тексте статьи повторяется, то повторно в квадратных скобках указывается его номер из списка (без использования в библиографическом списке следующего порядкового номера и ссылки «Там же»). В случае, когда ссылаются на различные материалы из одного источника, в квадратных скобках указывают каждый раз еще и номер страницы, например, [1, с. 17] или [1, с. 28–29].

Таблицы помещаются на новой странице после библиографического списка. Нумерация таблиц производится в порядке ссылок по тексту. Нумерационный заголовок таблицы набирается жирным шрифтом с выравниванием по правому краю (например, **Таблица 1**). Тематический заголовок (если имеется) набирается на следующей строке жирным шрифтом с выравниванием по центру. Ссылка на таблицу в основном тексте оформляется жирным шрифтом в скобках — например, **(табл. 1)**. Если таблица имеет большой объем, она может быть помещена на отдельной странице, а в том случае, когда она имеет значительную ширину, — на странице с альбомной ориентацией.

Рисунки последовательно размещаются на новой странице после таблиц (или библиографического списка). Нумерация рисунков производится в порядке ссылок по тексту. Нумерационный заголовок набирается жирным шрифтом с выравниванием по центру (например, **Рис. 1**). Тематический заголовок (если имеется) — в той же строке сразу же после нумерационного (например, **Рис. 1. Зависимость...**). Ссылка на рисунок в основном тексте оформляется жирным шрифтом в скобках — например, **(рис. 1)**. Если рисунок имеет большой формат, он должен быть помещен на отдельной странице, а в том случае, когда он имеет значительную ширину, — на странице с альбомной ориентацией. Рисунки могут быть сканированными с оригинала (150 dpi в градациях серого) или выполнены средствами компьютерной графики. Допускается, а в случае с иллюстрациями большого объема (файла) приветствуется, размещение рисунков в отдельном файле электронной версии. Подписи к рисункам должны быть выполнены непосредственно под рисунком.

На последней странице указать следующие **сведения об авторе:** фамилия, имя, отчество; ученая степень, звание, должность, место работы, номер телефона (не публикуется); адрес для переписки; для иногородних авторов — почтовый адрес, на который отправляется журнал, в случае публикации их статьи; две заверенные **рецензии** специалистов с ученой степенью (внутреннюю и внешнюю); **экспертное заключение** о возможности открытого опубликования.

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