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SUMMARY

PHYSICAL AND MATHEMATICAL SCIENCE

M. A. Zav'ialov, A. M. Zav'ialov, E. A. Bedrin
Mathematical modeling of thermal stability condition of frozen soil

It is given the mathematical model allowing estimating and predicting the condition of thermal stability of the frozen soil massif lying in the basis of artificial constructions.

Keywords: mathematical modeling, frozen soil, thermal stability.

O. V. Liakh, N. G. Eismont, Vad. I. Surikov, V. I. Surikov
Physical aspects of ageing of vanadium sesquioxide

It is well-known that vanadium sesquioxide (V_2O_3) possesses phase transition insulator — metal that is widely used in some modern systems of automation and control. However, V_2O_3 is the connection capable to spontaneous oxidation before connection V_2O_5, not possessing phase transition. It allows to speak about propensity of oxide to «ageing» and, as consequence, to change of its properties. In work the analysis of factors influencing speed of oxidation and as about ways of delay of process of ageing is carried out. Dependences of electric resistance on temperature (80 — 300K) for samples $V_{2\pm\delta}O_3$ and $V_{2\pm\delta}Me_{0,020}O_3$ (Me — Fe, Cr, Al) are for this purpose received. Some parameters of phase transition metal — insulator are defined.

Keywords: electrical resistivity, vanadium sesquioxide, phase transition, material ageing.

M. B. Moiseev, B. K. Nevorotov
The inverse problem of the theory of electromagnetic radiation

For a given interval on the frequency function of the emission spectrum is determined by an electromagnetic field that creates this spectrum.

Keywords: function of emission spectrum, electromagnetic field.

N. G. Eismont, Val. I. Surikov, Vad. I. Surikov, O. V. Liakh
The role of molecular mobility in the formation of the physical and mechanical properties of the modified polytetrafluoroethylene

The features of the influence of molecular mobility on the viscoelastic properties including the dynamic elastic modulus, polytetrafluoroethylene, a modified structurally active and inactive filler are analyzed. The determining role of molecular mobility in the formation of the temperature and concentration dependence of the dynamic shear modulus and mechanical loss factor in these materials is shown. The nature of the mobility of PTFE chains and, therefore, viscoelastic properties, when modifying whatever fillings, is determined by two factors: the energy and entropy.

Keywords: composites, polytetrafluoroethylene, modification, carbon, bronze, modulus of elasticity, viscoelasticity.

E. V. Bestsennaia
Invariant of n-twists symmetrization of Kauffman Polynomial

The classes invariant of *n*-twists knots and links are built based on Kauffman Polynomial.

Keywords: knots, links, invariants, Jones Polinomial, Kauffman Polinomial, *n*-twist.

E. G. Pavlova, I. I. Gonchar, T. A. Aronova
Accuracy of Kramer's formulas for the fission rate: Microcanonical Ensemble

The accuracy of the analytical formulas for the fission rate of excited nuclei is studied within the framework of the microcanonical ensemble. The Smoluchowski equation is used for the dynamical modeling. The deformation dependence of both the temperature and the single-particle

level density parameter is accounted for in the analytical formulas as well as in the dynamical modeling.

Keywords: fission rate, Kramers formulas.

CHEMICAL SCIENCE. CHEMICAL TECHNOLOGY. CHEMICAL INDUSTRY

I. A. Kirovskaia, L. V. Novgorodtseva
Mechanochemical research of catalysis activity of components of system GaSb–ZnTe

With the use of methods of Fyrue-spectroscopy and mechanochemical there is studied catalysis properties binary (GaSb, ZnTe) and multicomponent semiconductors of system GaSb–ZnTe in reaction of decomposition isopropil spirit. The role mechanochemical dispergation is shown: it is most active again formed a surface of semiconductors. The mechanism of decomposition is confirmed iso-C_3H_7OH. The most active catalyst — a firm solution of structure $(GaSb)_{0,95}(ZnTe)_{0,05}$ is revealed. The opportunity of estimation of relative catalysis is shown to activity on the basis of IR-spectra, not resorting to catalysis to researches.

Keywords: semiconductors, catalysts, IR-spectra, dehydrogen, dehydration, mechanochemical activation.

I. A. Kirovskaia, P. E. Nor
Chemical composition and acid-base properties of surface system components CdS-CdTe

For the first time chemical composition and acid-base properties of a surface of binary and multicomponent semiconductors of system CdS-CdTe are studied that sustained in atmospheric conditions, vacuum, and also the gases (NH_3, CO) subjected to the influence. Particular consistent patterns changing acid-base properties under the influence of the specified external factors and changing structure of semiconductors are determined. Possibility of preliminary estimation of adsorption activity according to acid-base characteristics of the surface is shown. The fissile found in relation to CO the adsorbent of structure $(CdS)_{0,16}(CdTe)_{0,84}$ is offered as the primary converter of the corresponding sensor.

Keywords: diamond like semiconductors, solid solutions, chemical composition, acid-base properties of the surface, the adsorption activity, primary converter.

E. V. Mironova
Decrease of viscosity of rubber adhesive by ultrasound

The impact of ultrasound on petrol solutions crude rubber (rubber glue), made on the basis of rubber leads to a significant decrease in the viscosity of glue, which allows to increase the concentration of the solution, to reduce time of evaporation of the solvent in the processes of bonding of rubbers, improve the properties of wet ability of the adhesive surface of the rubber.

Keywords: rubber glue, ultrasonic treatment, diffusion processes, the viscosity of rubber glue, the molecular mass of the compound.

MECHANICAL AND INDUSTRIAL ENGINEERING

A. A. Larin
Life and activity of professor Iuri. A. Gopp

The life of prominent scientist of mechanics, doctor of engineering sciences, professor Iuri. A. Gopp is presented in the article. Gopp is a specialist in the area of theory of vibrations, systems dynamics with combustion engines and theories of automatic control. It is one of establishers of the Omsk machine-building institute.

Keywords: diesel engine, torsion vibrations, damper, antivibrator.

S. S. Vyborov, A. Iu. Popov
Trends of positioning of OmSTU as the base of regional innovation-technological centre of metal prosessing

Implementation of the programs of technical re-equipment of the enterprises is impossible without the effective solution of the tasks of the technological audit of production, selection of advanced technologies, models of software and hardware, preparation and execution of the contracts. A great role is played by the organization of service provision (running of the equipment, warranty and post-warranty service, delivery of spare parts, tools), and, of course, the most important part of the service provision is the training of the personnel.

Keywords: metal-processing, innovative-technological center.

P. D. Balakin, Iu. A. Bur'ian
Justification of a choice of the scheme of the universal stand for experimental definition of geometry of mass of real complicated technical objects

Exact definition of inertial characteristics of difficult real mobile technogenic objects is the actual problem solved only by practice. Despite of diversity of technical solutions of known stands the design of the scheme of the universal stand is interesting and economically proved task in the applied plan.

Keywords: real object, inertia moment, frequency of own fluctuations, stand.

I. M. Kovenskii, K. V. Kuskov, I. A. Venediktova
Fatigue failure of welded joints of pipe steels 09G2S and 17G1S-U

In this paper, the influence of welded joints on the endurance samples is studied. Quadratic equations are obtained depending on the number of cycles to failure of welded joints of steels 09G2S and 17G1S-U of the maximum tensile stress and stress amplitude. Scanning electron microscopy revealed the fracture behavior of welded joints of pipe steels.

Keywords: fatigue, weld, surface of fracture, pipe steel.

V. N. Kuskov, A. G. Obukhov, R. A. Mamadaliev
The influence of chromium on the transition into the deposited metal when welding 20X13

The influence of the intensity of the current and the type of power source for the transition of chromium into deposited metal in welding of steel 20X13 is investigated. It is found reduction of transition of chromium into deposited metal at increase of intensity of the current accelerating due to its burn-off. The efficiency of application of the inverter power source increases in case of increase of intensity of the current of up to 140 A.

Keywords: chrome, steel 20X13, welding rectifier, the inverter power source, the intensity of the welding current.

V. I. Trushliakov, E. A. Iutkin
Overview of means for docking and capture of large-scale space debris objects

This article provides an overview and analyzes of means and methods for docking and capture of non-cooperative large-scale space debris objects. Systemized information about developing in USA and in European Union countries devices for docking and capture and main approaches for solving accompanying problems are obtained in this article.
For reusable system there is formulated requirement that needed for successful organization of docking with non-cooperative objects and their tugging to utilization orbit.

Keywords: near-Earth space pollution, large-scale space debris, capture, docking with non-cooperative objects on orbit.

D. I. Cherniavskii, D. D. Cherniavskaia
Mechanical impulse of energy of a material point of variable weight

In the article the urgency of application of the size named «a mechanical impulse of energy» is proved. The physical sense of the given size characterizes efficiency of change of power condition of a body. If the physical object is an energy source which will be transformed into its mechanical motion, the size of an impulse of energy should strive to a maximum. On the contrary, if the main task is economic use of power resources, the size of an impulse of energy should be as minimum as possible.
In the work, examples of use of an impulse of energy for studying of movement of bodies of variable weight are considered.

Keywords: energy, a mechanical impulse, the rocket technics, elementary work.

V. E. Shcherba, A. K. Kuzhbanov, E. A. Pavliuchenko, A. P. Bolshtianskii
The analysis of the effect of angular velocity of the crankshaft on the efficiency of the pump-compressor with gas damper

In this paper the influence of the angular velocity of the crankshaft on the energy and performance of reciprocating pump-compressor with gas damper. The main results of the calculations obtained from the analysis of the influence of the angular velocity of the shaft at a delivery rate indicator isothermal efficiency, the amount of diverted heat into the compressor chamber and gas leaks in the compressor chamber.

Keywords: pump, compressor, gas damper, volume efficiency, isothermal efficiency indicator.

A. L. Akhtulov, A. V. Shimokhin, L. N. Akhtulova
Probability model of reliability of mobile unit in system of maintenance service and repair of cars

In the article there is considered probability model of reliability of mobile unit in the system of maintenance service and repair of cars on the example of gear box bearing put in the basis of a technique of forecasting of failure due to monitoring of rate of tear and wear.

Keywords: vibrating diagnostics, monitoring of the equipment, TPM, the personnel, system of scheduled preventive maintenance.

I. S. Vavilov, E. A. Cherevko
Theoretical and experimental study of the method of increasing stability in yaw land aircraft on an air cushion

This work complements the theoretical and experimental studies carried out to provide stability of an aircraft on air cushion under the effect of crosswinds. We consider three cases of motion of LAVP using disk wheels without rim under different side winds.

Keywords: apparatus hovercraft, yaw stability, wind resistance.

V. F. Kovalevskii
Tribological characteristics of friction pairs with oil-retaining relief, drop-shaped adhesive technology

The paper examines the impact of oil-retaining relief, drop-shaped adhesive technology (DA Technologies), on the static friction of samples, friction for steady motion, friction coefficient, and the temperature of the friction zone and the duration of the running.

Keywords: friction, wear, oiling, relief, component part.

V. A. Konovalov, D. V. Obukhovskii, A. M. Proskuryn
Determination of tension of fluidity of steel 20 became after the cold wringing of the thick-walled pipes by a conical matrix

Tensions of fluidity are experimentally evaluated for steel 20 in different zones of the wrung out thick-walled pipe standards. Wringing is executed by conical matrices with angles (on the side) in 100, 150, 22°30' and by wringing coefficients 1,25, 1,40, 1,55, 1,70. Deformation came true in the cold state. The values of tensions are calculated through the sizes of hardness, HRB measured in units. Data can be used for the account of work-hardening at planning of technological processes of stamping by wringing.

Keywords: wringing, thick-walled pipe, conical matrices, tension of fluidity, wringing coefficient.

O. V. Kropotin, Iu. K. Mashkov, O. A. Kurguzova
Designing a polymeric antifriction nanocomposite on the basis of polytetrafluoroethylene with the raised wear resistance

The polymeric antifriction composite on the basis of polytetrafluoroethylene is designed. In composition of the complex filler carbon nanotubes are used. As the way of increase of structural modifying effectiveness the method of restriction of thermal expansion in volume of a material is applied at its sintering.

Keywords: polymeric composite, polytetrafluoroethylene, nanotubes, restriction of thermal expansion

O. V. Kropotin, Iu. K. Mashkov, V. A. Egorova, O. A. Kurguzova
Design of polymeric composites of tribotechnical appointment with microdimensional modifiers

Results of development of new polymeric composite materials on a basis of polytetrafluorethylene are considered at introduction in a matrix of micro-dimensional powders of nitride of the titan, carbide of silicon and cryptocrystalline graphite. The interrelation of structural changes in polymer with the increase in wear resistance of polymeric composite material is established.

Keywords: polymeric composite material, polytetrafluorethylene, modification, filler, wear resistance.

O. S. Lomova
The mathematical modeling of the structural changes in the surfaces of workpieces during thermal perturbations in the grinding process

The article presents the mathematical relations for the calculation of grinding temperature and depth of penetration into the surface layer of the workpiece. The conditions reducing these parameters on machining accuracy are defined and notes give general recommendations for the management of grinding cycles based on structural changes in the surface layer of the workpiece.

Keywords: external grinding, thermal deformation, precision machining, structural changes in the workpiece surfaces.

O. S. Lomova, I. A. Sorokina
The investigation of precision cylindrical grinding simulation modeling

The article presents a mathematical model of the grinding process with the dynamic phenomena. The ability to monitor transient cycles of grinding allows you to find the conditions to reduce their negative impact on the accuracy of the workpieces and choose rational processing options.

Keywords: grinding process, accuracy, dynamic model of grinding machines, the elastic deformation.

V. V. Degtiar'
Durability of bearings of heavy loaded machines units

The article considers the problem of increasing resource of rolling bearings. A method and mechanism for increasing the durability of bearings by electrical, chemical, mechanical processing is suggested. Processing parameters, the working fluids, and a method of diagnosing electrical, chemical, mechanical processing of bearings is shown.

Keywords: resource, durability, bearing, increase.

Iu. P. Makushev, A. V. Filatov
The effect of the intensity of the process of fuel injection on ballistics of torch

The assessment of the intensity of the process of injection fuel system with mechanical and battery with electronic control, determined the effect of pressure, the diameter of the nozzle orifices on the small diameter and long-range spraying of fuel jet. It is shown that the period of delay of the ignition, flame length, the size of the combustion chamber is to be agreed.

Keywords: fuel injection, the intensity, the fineness of atomization, the torch range.

A. A. Razhkovskii, A. G. Kisel', A. A. Fedorov, D. S. Rechenko
Lubricant and cooling liquid influence at the moment of processing by U8 steel cutting

It is known that when cutting metals practically all energy is spent for a friction and goes to heat. Therefore, when studying process of cutting from the point of view of wear of the cutting tool it is necessary to give the main attention to friction and thermal processes.
Direct influence on productivity and quality of processing of materials cutting renders lubricant cooling technological means (LCTM), carrying out cooling, lubricant and washing actions.

Keywords: lubricant cooling liquid, friction moment, cutting, steel.

E. S. Tereshchenko, I. A. Murog, D. Iu. Fadeev, D. V. Shabalin
A way of increasing the mobility multi-purpose vehicles of the operation on various road conditions

On the basis of simulation modeling investigated and substantiated by the technical-technological solutions to improve the allocation of power between the leading wheels of cars multi-purpose by means of a mechanical transmission, implement: rational distribution of power between the leading axles; the method of periodically switchable all-wheel drive; method of management of a slipping drive wheel by the application of brake torque and (or) reduction of the fuel supply; method of blocking the automatic brake and axial connections.

Keywords: transmission, vehicle multi-purpose, differential gear ratio.

E. S. Tereshchenko, I. A. Murog, D. Iu. Fadeev, D. V. Shabalin
To the question of increase of the efficiency of the steering multi-purpose vehicles

The article presents the results of research and reasonable technical solutions for the elimination of deficiencies steering multi-purpose vehicles of, as well as the dependences of the required angle of the power of the static characteristics of the steering control from the moment of resistance of the turn of the steered wheels

Keywords: steering control, multi-purpose vehicles, steering actuator, angle of turn

N. N. Chigrik
Estimation of accuracy of element dimentions of parts in cylinder-piston group of the automobile motor engine ZMZ-511.10

On the foundation of study of problems of accuracy of the element dimensions of parts of cylinder-piston group of the automobile motor

engine ZMZ-511.10 at their complete set and element set interchangability by the method of selective assembly on groups of the true repair sizes, application of the method of calculation of the probability performances of cylindrical couple and plot of account of probability allocation of gaps and negative allowances in couples «cylinder—piston», «opening in the cylinder piston under the installation of a piston pin—piston pin», «a piston pin—opening in the bush to the upper head of a connecting rod in gathering» are given proportions of allocation of gaps and negative allowances in the indicated couples and functional design dependence of definition of an idealized gap and negative allowance in cylindrical linking.

Keywords: dimensional accuracy of members of parts, shape of surfaces of members and their positional relationship, method of application of calculation of the probability performances of linking of parts, wear, fits.

B. Sh. Alimbaeva, D. N. Korotaev, Iu. K. Mashkov
Synthesis of nanocomposite coatings with high physical-mechanical properties by the method of spark alloying

The influence of a material of an alloying electrode on microhardness, phase structure and thickness of a formed covering is investigated at an electrospark alloying in various technological conditions. The X-ray phase analysis of the coverings created by an electrode of IMH2, established existence intermetallic compound with the smallest size of the crystallites, providing the maximum microhardness.

Keywords: electro-spark doping, alloying electrode, microhardness, phase composition, thickness of covering.

S. S. Anishchenko, A.Iu. Popov
Development of methods for rational selection of equipment

A new concept on the base, which contains the principle that perform «rough» operations carried out on the old machine, and «finishing» operations at brand new equipment. It is proved that this method of new machines retain high precision machining for much longer. The calculation of economic benefits with machine-hours is done.

Keywords: machine-hour, modern equipment, the benefits, the complexity.

D. L. Vavel, N. A. Shevelev
The main parameters of continuous casting definition

In the article it describes the continuous casting modeling process of the precious metal mini-outfit. It was decided to convert it into steel and its alloys outfit. There are found: optimal casting speed and melting temperature. It uses application package «Poligon» for calculations.

Keywords: continuous casting, casting, mold, mould.

I. I. Koshukov
Precision finishing of planar parallel surfaces

Finishing process of planar parallel surfaces of high-precision parts is investigated. Mathematical modeling of the uniform wear of a lap surface is developed. Designing stages of a real device for finishing of planar parallel surfaces are introduced. The ways of practical application of the research for the purpose of modern production are recommended.

Keywords: precision finishing, mathematical model, specific work, scaling factor.

A. S. Niteiskii
Design of ruled surfaces by moving Frenet trihedron

An approach to designing of ruled surfaces by moving Frenet trihedron, based on planar curves is considered. There are examined some examples of design based on second-order curves. The obtained results can be used as a basis for designing complex technical ruled surfaces of shells machine parts, consisting of line segments, which are docked on the conditions of contact.

Keywords: a developable ruled surface, Frenet trihedron, the complanarity condition of vectors, chisel.

A. M. Selishchev, I. V. Petunin, G. A. Goloshchapov, K. V. Kostin, I. A. Kudriavtsev, K. A. Grymzin
Selection of method for anti-wear properties of lubricants in case of abrasive wear

In the article it is designed new friction gage, that is analyzed the influence of dispersions and concentrations of abrasive on anti-wear characteristic of lubricant, there are developed methods of testing the lubricants and ways of its application.

Keywords: friction gage, methods, wear-out, lubricants.

V. Iu. Usikov, S. V. Ushnurtsev
Mathematical model for calculation of route of motion of wheeled vehicles

The mathematical model of calculation of a route of movement of wheel cars is presented.

Keywords: route, road leg, road conditions, efficiency of use of wheeled vehicles.

V. R. Edigarov, V. V. Degtiar', V. V. Malyi
Mathematical model of temperature parameters of friction-electric modifying

The results of the study and mathematical modeling of temperature parameters in the treatment area during friction-electrical modifying of steel friction surfaces are presented.

Keywords: modification, the contact area, roughness, electric current density, process parameters.

M. I. Tribelskii
Results of experimental research of rubber-cord branch pipe gate valve

The technique and results of experimental research of fatigue strength of rubber-cord branch pipe gate valve on number of cycles of opening / closing are given in the article. It is shown that the lifetime of rubber-cord branch pipe gate valve by 2—3 times exceeds the life time (500—5000 cycles), guaranteed by the manufacturer of analogs — metal gate valve with the rubberized wedge, and it grows with the increase in diameter of a branch pipe.

Keywords: rubber, fatigue, rubber-cord branch pipe gate valve, resource, cycles of opening/closing

ELECTRICAL ENGINEERING, INDUSTRIAL ENGINEERING

A. V. Bubnov, I. V. Fedorov, L. G. Polyntsev
Entropy model of interrelation of power industry and economy

In this article questions of creation of conceptual model of a sustainable development of power industry on the basis of the self-organization theory in interrelation with economy are considered. The entropy model of long-term planning of production, distribution and power consumption in electrical power system is offered.

Keywords: electropower system, entropy model, interrelation of power and economy.

S. Iu. Dolinger, A.G. Liutarevich, V.N. Goriunov, D.G. Safonov, V.T. Cheremisin
Estimation of additional power losses and power quality decrease in basic elements of power systems

The article is devoted to estimation of additional power losses and decrease power quality in basic elements of power systems. In the article the analysis is made of methods of definition of power losses and decrease of power quality. In the conclusion, the algorithm of work of the program, allowing estimating size of losses and decrease of power quality, and its possibilities is resulted.

Keywords: power losses, decrease power quality, the program for calculation of losses.

E. P. Zhilenko, S. Iu. Pruss, N. Iu. Fomenko, D.E. Khristich
Controlled chaos under steady-state conditions electric power systems

Nonlinear dynamics has been successful in explaining the obvious limit behavior of electric power systems (EPS). Components of the EPS nonlinear and linear methods of their analysis sometimes lead to a wrong prediction of the behavior of EPS. In real EPS there are processes that fit into the General framework of chaotic dynamics.

Keywords: energy systems, nonlinear dynamics, stability, bifurcation, chaos.

E. V. Petrova, A. Ia. Bigun, V. N. Goriunov, S. S. Girshin, A. A. Bybenchikov
Estimation of errors in losses of electricity in wires of increased bandwidth due to neglecting atmospheric factors and regime

The article describes the high-temperature wire of increased bandwidth. Calculation the temperature of the wire and the loss of electricity in the wires of the increased bandwidth with the weather conditions and load variations is done.

Keywords: load, wire high bandwidth, loss of energy, temperature, wind.

E. V. Petrova, S. S. Girshin, N. V. Kirichenko, E. V. Ptitsyna, E. A. Kuznetsov
The Standard CIGRE for peer review program calculation of electric energy loss with respect to temperature conductors

The article describes the methods of calculating the losses of electricity in non insulated wire of overhead transmission lines. The analyses of their applicability in terms of modeling accuracy of temperature conductors relative to the standard CIGRE is done. Recommendations for practical calculations of temperature bare wires and active power losses are given.

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

D. G. Safonov, A. G. Liutarevich, S. Iu. Dolinger, S. V. Biriukov
Impact of voltage deviation on power losses in electrical equipment of power grids and consumers

The article is devoted to questions of impact of voltage deviation on work of electrical equipment. In this article there is considered dependence of power losses from voltage levels in transformers and transmission power networks, electric motors and light sources. There are presented results of calculation of the additional power losses from voltage deviates depending on the load of electrical equipment.
This research is carried out with financial support from the government through the Ministry of Education and Science of Russia.

Keywords: voltage deviation, power losses, reactive power, load factor.

M. Ia. Kletsel, N. M. Kabdualiev, T. A. Novozhilov
Reserve protection against short-circuits to the earth of ring schemes of power plants

The methodology of creation of common reserve protection against short-circuits to the earth for lines and raising transformers of the main schemes of power plants is explained. Algorithms of functioning are given. Questions of sensitivity and choice of parameters of protection are considered. The realization example is given.

Keywords: protection, transformer, line, ratio of currents, capacity direction, zero sequence.

K. I. Nikitin, A. N. Novozhilov, D. A. Kudabaev, T. A. Novozhilov, O. A. Sidorov
Sensitive protection against short circuits to the earth on transformers of current of zero sequence with the magnetic switch

In this article create protection against single-phase short circuit on the earth in cable networks with the isolated neutral and a way of reduction in cost of this protection are described. Transformers of current of zero sequence like TZL or TZRL and sensitive reacting body are used. As a rule, this is special and quite expensive relay. Depreciation of protection against single-phase short circuit to the earth can be carried out if in protection of the relay to replace with the magnetic switch.

Keywords: protection against short circuits to the earth, magnetic switch. transformer of zero sequence, constant magnet.

S. S. Girshin, N. V. Kirichenko, S. S. Kiselev, D. E. Khristich, V. V. Kharlamov
The effect of temperature on the load coil active power losses in power transformers substations

There is considered load active power losses in power transformers as a function of temperature. It is shown that this dependence includes the non-linear component, due to the presence of the additional losses. The formulas for calculating the loss at a given average temperature of the windings are obtained. On the example of the transformer TMN-6300/35 there is compared the temperature dependence of the load losses in lines and transformers.

Keywords: loss, power transformer, thermal processes, winding line.

D. S. Osipov, A. A. Plankov, A. E. Bugreeva, N. N. Dolgikh, E. N. Eremin
Accounting for the effects of the higher harmonics of current and voltage stability to criteria of static stability of the assembly of electric power systems with asynchronous load

The article is devoted to non-sinusoidal electric power systems and power distortion. Also the article is devoted to the influence of the higher harmonics to criteria of static stability of the assembly of electric power systems with asynchronous load.

Keywords: criteria of stability, static stability, asynchronous load, higher harmonics.

V. N. Goriunov, K. V. Khatsevskii, A. A. Shagarov, D. A. Shagarov
Research of the influence of semiconductor converters on a power line based on mathematical models

In the article the research of the influence of the auxiliary power supply on a power line by the imitating models created in the program MatLab complex are executed. Oscillograms of currents and voltages on elements of the scheme, the chart of spectral structure of network current are received.

Keywords: quality of the electric power, electromagnetic compatibility, mathematical model, auxiliary power supply

A. D. Ernst, P. N. Matvienko, T. P. Matvienko
Compensation of capacitive current of earth short circuit in networks 6–10 kV energy-intensive industries

The article focuses on compensation of capacitive currents in the electrical systems of industrial energy-intensive industries. The differences of the laws change and proposed a nonlinear extrapolation formula for the calculation of the capacitive earth fault current targeting a minimal thermal cross section of cable lines for paper cables and modern cables with XLPE insulation. On the example of energy-intensive industries it shows that the choice of the degree of mismatch compensation requires the inclusion capacity of electric motors, transformers and feeders.

Keywords: capacitive current cable XLPE capacity connections, power supply reliability.

E. G. Andreeva, A. A. Tatevosian, I. A. Semina
Analysis of models of magnetic open systems in the complexes of software ELCUT and ANSYS

The article describes the physical objects and compiles mathematical models, an experimental and numerical simulation for correct determination of the boundary conditions.
The analysis of the results confirms the validity and accuracy of mathematical modeling and software applications ELCUT 5.6 and ANSYS 10.0 (professional version).

Keywords: magnetic system open, mathematical models.

V. R. Vedruchenko, N. V. Zhdanov, E. S. Lazarev
Economic impact of harmful emission of heat engines by usage of alternative fuel

Condition of problems of assessing economic impact from total exhaust of ship internal combustion engines (ICE) is considered in this work. It is noted that, ISO standards regulate descriptions, composition and setting of ICE harmful emission. Main ways of toxicity decrease, at the same time, efficiency increase of diesel engines, operating with kinds of fuel, with different properties, are formed. Backgrounds for economical impact of pollution of ICE exhaust approximate estimation are obtained.

Keywords: harmful emission of diesel engines, economical damage, alternative kind of fuel, atmosphere pollution.

V. R. Vedruchenko, V. V. Krainov, N. V. Zhdanov, D. K. Kuznetsova
Choice of mixing devices for high-stability fuel mixture in the fuel processing systems of power plants

The opportunity to use diesel engines for fuel blends of diesel fuel standard (GOST 305-82) and alternative is shown. Prospects of such act are in reducing of toxicity of exhaust gases of diesel engines and decrease of fuel costs. The existing market of technical devices to obtain highly stable fuel blends is analyzed. There is shown perspective of the use of mixing and metering device providing both the necessary quality of mixing and regulation of the mixtures, its metering and fuel feed.

Keywords: alternative fuels, diesel power plant, mixer-feeder, homogenizer, mixing, toxicity of exhaust fumes.

A. P. Popov, V. Iu. Susoliatin
Theoretical substantion of microprocess device control algorithm for electrical energy measurement while starting up internal combustion engine

The paper considers algorithm of management program for digital microprocess measurement devise intended for energy control spent by chemical source of current while starting up internal combustion engine by means of using current sensor based on Hall's effect. The paper presents electrical scheme of the device and algorithm for program functioning.

Keywords: electrostarting up of the engine, algorithm for energy calculation, electrical energy quantity for starting up.

A. V. Sapsalev, S. A. Kharitonov, E. I. Algazin
Power supply system for autonomous transport applications

Capabilities of an aircraft and autonomous transport supply systems are considered. A new AC voltage stabilization system operating with wide range of the shaft rotating velocity of the permanent magnet generator primary engine is proposed.

Keywords: electrical system, generator, inverter voltage moving coil, electric actuator.

V. L. Iusha, G. I. Chernov
The analysis of the thermodynamic efficiency of the Rankine cycle in Recuperation system of heat losses in compressor unit driven by the internal combustion engine

The article describes the current issues of increasing efficiency of mobile compressor units driven with internal combustion engines. The analysis of the thermodynamic efficiency of the Rankine cycle in recuperation system of heat losses of such units. It is theoretically demonstrated the possibility of a significant increase in the technical and economic performance of the compressor units of this type.

Keywords: compressor, internal combustion engine, recuperation system of heat losses, Rankine cycle.

K. V. Khatsevskii, O. A. Andreeva,
The influence of network voltage parameters on inaccuracy of spectral methods of diagnostics

It is given estimation of the influence parameter to electric network on inaccuracy of the determination information sign methods of the functional diagnostics, using spectral analysis temporary signal on the base of the quick transformation Furie.

Keywords: spectral analysis, measurement inaccuracy, linear interpolation, diagnosing algorithm.

O. A. Komiakova
Application of artificial neural networks as a tool for electricity load forecasting in railway enterprises

The article deals with the application of artificial neural networks for electricity load forecasting. It describes how to train a neural network, proposed criteria for selecting the optimal structure and parameters of the network. There is completed testing of the proposed method for railway transport.

Keywords: planning, artificial neural network, synapse, modeling.

INSTRUMENT ENGINEERING, METROLOGY AND MEASURING INSTRUMENTS AND SYSTEMS

Iu. N. Klikushin, V. Iu. Kobenko
Identification method of signals classification

The method of signals classification, based on results of measurement of their identification characteristics (parameter of a form and characteristic frequency) is described. The offered method allowed to allocate (in the form of the two-dimensional table) and to estimate limits of existence of different types of signals.

Keywords: identification scale, measurement of signal parameters, the classification model, periodic and random signals, the characteristic frequency.

V. V. Kuznetsov, A. A. Novikov
Technical implementation of poly-frequency bioimpedance spectrometry in diagnosis studies

Present article describes the technical solutions developed for practical implementation of techniques of poly-frequency bioimpedance spectrometry in purposes of early diagnosis of diseases with different etiology. Comparative analysis of analogues performed and described, additionally solutions to improve the basic characteristics of poly-frequency bioimpedance spectrometry devices proposed. Technical solution for device that enhance the capabilities of existing instruments of bioimpedance spectrometry diagnosis developed and proposed.

Keywords: bio-impedance parameters of living tissues, diagnosis of pathologies, noninvasive diagnostics, methods and devices for detection of vital activity of bio-systems.

INFORMATION TECHNOLOGY

E. S. Giunter, N. N. Narutta, V. G. Shahov
Cloud services and problems of cloud service security

In this article the authors reveal the modern technology of information processing — so-called «cloud» technology. Basic information in this area, the existing standards and the concomitant threat to information security are presented. Also highlight the safety analysis technique based on a new research areas - information risk management.

Keywords: cloud services, SOAP, REST, hypervisor, encryption, security threat.

K. A. Koroleva
The method of optimal interpolation with neutral on convolution vector defined on a Hilbert space

This paper deals with the problem of interpolation signals with neutral on convolution vector. The paper constitutes a review of the method of interpolation, which has the best result in sense of uniform distribution of the mean square error of interpolation in the spectral region. The results of numerical experiment is followed by the theoretical considerations. The efficiency of the method under discussion is illustrated in sense of increasing the accuracy of interpolation of signal.

Keywords: optimal interpolation, Chebyshev window, theorem Kotelnikov, spectrum.

I. I. Vavilova, I. V. Revina
Modeling of technogenic influences on environment with use of a computer

In this paper the model of distribution of liquid contaminants in the soil. A complete simulation of the parameters of pollution in the soil is done using systems of computer mathematics.

Keywords: systems of computer mathematics, distribution of liquid contaminants in the soil, oil saturation.

M. S. Peshko, A. V. Fedotov
The problem of fuzzification parameters of vegetation process in fuzzy controller

The paper proposes the automated intelligent system control of vegetation process based on fuzzy-control. To solve the problem fuzzification process parameters using the modified method of Saaty, combined with an expert-knowledge of technologist of Omsk commercial greenhouse complex. To optimize the descriptions obtained membership functions are approximated in the package of symbolic mathematics Maple.

Keywords: fuzzy-control, fuzzification, method Saaty, fuzzy sets.

M. S. Peshko
Simulation of fuzzy controller of vegetation process

A system of intelligent control based on fuzzy controller that manages the process of vegetation to the conditions of the process is designed. The rule base of a fuzzy controller is based on accumulated technology experience and the experience of technologists Omsk enterprise. Results of intellectual control system are shown in the mathematical laboratory Matlab with Simulink and Fuzzy Logic Toolbox packages.

Keywords: intelligent control system, fuzzy regulator, vegetation process, rule base, Matlab, Simulink.

RADIO ENGINEERING AND COMMUNICATION

V. A. Berezovskii, K. A. Sidorenko, A. A. Vasenina, A. V. Benzik
The impact of error of elevation angle on accuracy of single-station location

The elevation angle accuracy by two popular direction finding algorithms called MUSIC and ESPRIT for the case of uniform circular array for various signal to noise ratio is estimated. Calculation of ray trajectories with the use of two-layer model ionospheric plasmas is carried out on which data dependence of length of route on the elevation angle. Results of modeling of relative error of determination of distance to the signal source for considered direction finding algorithms are presented. The technique of a fast evaluation of a relative error of definition of length of a route for algorithms of direction finding is offered.

Keywords: direction finding, single-station location, ionospheric electron density profile.

D. A. Boreiko
Enhancement of radar filters characteristic

In this paper it is examined the design issues of radar filters, also an attempt of characteristic improvement via the study of device engineering part is made and an evaluation technique of the printed-circuit board topology on its modelling basis is given. As the result we got an experimental verification of this method reliability.

Keywords: radar filter, LC-filter, printed-circuit board, electromagnetic compatibility, amplitude-frequency characteristic.

A. V. Maistrenko, A. A. Svetlakov, N. V. Starovoitov
Digital differentiation of measured signals with application of the integrated equations of V. Volterra and its regularization

In the article new original way of digital differentiation of the signals intended for the use in real time is offered and investigated. The way is based on application of the integrated equations of Volterra I of a sort. Some results of pilot studies illustrating its working capacity and suitability for use in systems of automatic control of real time are given.

Keywords: differentiation, integrated equation, regularization, matrix.

A. S. Molodtsov, A. V. Kosyh
Analysis of operation of the Cartesian system of back coupling

In the article the basic principles of operation of the Cartesian cycle of back coupling are discussed. The main problems which arise in case of creation of radio frequency amplifiers with the Cartesian back couplings are considered. The exact analysis of the Cartesian system of back coupling is made, and conditions of its steady operation are shown.

Keywords: linearization, preliminary distortions, back coupling, phase offset.

A. F. Plonskii, T. V. Plonskaia, A. L. Boran-Keshish'ian
«Black holes» of satellite systems

This article analyzes the current state of satellite navigation and communication systems. It is shown that euphoria of the last decade was born by creation of satellite navigation and communications systems in the eighties of the twentieth century. It has resulted in a hasty destruction of the majority of similar land-based systems, than has been replaced by growing worried. The article predicts development of the situation. Authors consider that decision of the problem is creating of a global network of eLoran navigation systems, which are precision like satellite systems.

Keywords: satellite system, a magnetic storm, weakness, damping signals, spoofing, eLoran.

PUBLISHING. POLYGRAPHY

S. N. Litunov
About mixing ink in a paint box

Options of activators for paint hashing in a paint box of the printing machine are considered. The offered activators do not demand additional external energy, and work from powers of viscous friction of printing paint. Results of calculations and experiments are given.

Keywords: printing machine, colourful box, viscous paint, supply of paint.

I. A. Sysuev, A. A. Ivleva
Optimization of the process of reproduction of black and white photo images in the efficient polygraphy

The possibility of the reproduction of black and white photo images while getting printed reprints by risography is regarded in the article. The influence of scanning rates of black and white photo images on the reproduction of gradation is researched, conditions for the gradational correction for the efficient tone reproduction while printing on the risograph are set. Recommendations for the different by their grade content images are made.

Keywords: risography, tone reproduction, black and white photo images gradational correction.

I. A. Sysuev, O. A. Timoshchenko, Iu. S. Grigorova
Evaluation of the efficient contrast of graphical sketch of a page of printed and electronic publications

The questions related to the creating of an attractive and convenient for reading exterior sketch of a page of printed and electronic publications are regarded in the article. Evaluation of graphical sketch of the page is made according to one characteristic — contrast, defined as the saturation of the set of text elements found on the page. Methods of evaluation of the contrast are given. Magnitude values of the efficient contrast for printed and electronic publications are established.

Keywords: graphic sketch of a page, printed and electronic publications, contrast, saturation of the text elements, methods of evaluation of the contrast.

N. A. Mul'tanovskaia
Application of dynamic thermoplastic elastomers as a material for flexographic printing press KDO 508 Seeltec 2-8 model 6c 100

In this work the possibility of application of dynamic thermoplastic elastomers on the base of polyamide and elastomers with different nature is studied for manufacturing cartridges of pressure shafts of flexographic printing press KDO 508 Seeltec 2-8 model 6c 100.

Keywords: flexography, printing press, cartridges, dynamic thermoplastic elastomers, durability.

O. A. Timoshchenko, N. A. Mul'tanovskaia
Development of composite materials based on polyamide and elastomers for details of printing machines

Possibility of development of composite materials based on polyamide and elastomers with different nature is studied in this work with the use of quantum chemistry methods. Strength properties of composites are given. The possibility of application of them as parts of printing presses is shown.

Keywords: printing press, bush, composite, quantum chemistry, strength.

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 внутристрочные 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 дублируются 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 spi 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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