Abstracts and keywords by № 3(47) 2015

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| **1** | MODELLING OF MASSTRANSPORT WITH PHYSICAL ADSORPTION IN MICROPORE SYSTEMS BY MOLECULAR DYNAMICS  SIMULATION  A.N. Agafonov1, A.V. Eryomin1, S.B. Konygin2, V.I. Platonov  1 S.P. Korolyov Samara State Aerospace University  34, Moskovskoye sh., Samara, 443086, Russian Federation  2 Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  This paper concerns the modelling of physical adsorption and masstransport processes in micropore systems by means of molecular dynamics (MD) simulation. An individual infinite-tube shape periodical-texture 3D pore with the 5-10 LJ potential of the walls was chosen as an example system. The spatial distributions of the sample particles in various timepoints and under various boundary conditions were obtained as a result of the modelling. In addition, the influence of the potential well parameters on the kinetics of the lengthwise adsorption and masstransport processes was shown. Besides, another result of the modelling is kinetic energy distributions without taking into account the effect of the system heterogeneity.  **Keywords:** micropore, masstransport, adsorption, molecular dynamics.  Р. 7-11 |
| **2** | **CONTROL OF THERMAL FIELD OF ROD WITH FUZZY MODAL CONTROLLER**  ***I.A. Danilushkin***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  *The paper deals with a typical problem of thermophysics process - the formation of a given temperature distribution along the length of the rod with unknown heat losses from the lateral surface.* *The problem is considered in one-dimensional formulation. The modal representation of the object management is used to generate the control action.* *Formation of the control action is carried out by using the membership function of the fuzzy controller output, defined on the distribution range of internal heat sources.* *The value of membership function at each point plays the role of the proportional coefficient for the power sources of heat.* *The results of computational experiments show the system efficiency.*  ***Keywords:*** *distributed parameters plant, modal control system, fuzzy logic controller, membership function, fuzzy logic conclusion, distributed parameter control.*  Р. 12-16 |
| **3** | METHOD OF PARAMETRIC OPTIMIZATION IN THE BOUNDARY  INVERSE HEAT PROBLEM USING THE DISTURBANCE FILTERING  A.N. Diligenskaya  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  This paper investigates the boundary inverse thermal conductivity problem of determining a value of heat losses in the typical case of the disturbed noisy temperature measurements. Firstly, the smoothing of experimental data by cubic splines smoothing method is applied. Secondly, the method of parametric optimization based on qualitative features of the error of approximation of the calculated temperature field to smoothed experimental data is presented. The time behaviour of approximating curve at different noise level and various value of smoothing parameter is investigated. The solubility of inverse thermal conductivity problem at low noise is shown.  ***Keywords:*** *boundary inverse heat conduction problem, random disturbance, smoothing cubic spline, parametric optimization, approximating curve behaviour.*  Р. 17-24 |
| **4** | SEMI-MARKOV MODEL OF INFORMATIONAL SYSTEM WITH  VARIABLE PROBABILITY OF ILLEGAL ACCESS TO INFORMATION  ***A.I. Kovalenko***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  Informational system secured from illegal access to information is studied. Attempts to get illegal access to secured information make a recurrent flow. And the probability of their success varies in time. Security system is restored. It results in restoration of security reliability. The embedded Markov chain stationary distribution is obtained as the solution of the system of integral equations. The problem of two-criterial restoration period optimization is set and solved. A numeric example of this problem solution with the help of linear convolution of economical criteria is given.  **Keywords:** informational system, security system restoration, embedded Markov chain stationary distribution, stationary indexes, two-criterial optimization.  Р. 25-31 |
| **5** | **Problem statement peculiarities of flight program and cargo flow scheduling of the Russian Segment of the International Space Station**  ***O.I. Lakhin***  Smart Solutions, Ltd.  17, Moskovskoe shosse, Samara, 443013, Russian Federation Business center “Vertical”, office 1201  E-mail: lakhin@ smartsolutions-123.ru  The problem statement peculiarities of the flight program and cargo-traffic scheduling of the International Space Station Russian Segment are considered. The criteria, rules,and constraints which influence the scheduling of the flight program and cargo traffic are described. Using a formalized approach, the paper demonstrates how a dynamic balance of interests of the spacecrafts, the ISS RS modules and on-board systems, as well as flights and cargos, is achieved. It presupposes mutually coordinated consideration of a range of individual peculiarities of the cargos, spacecrafts, the ISS RS modules and on-board systems.The conclusion that the multi-agent technology, domain ontology, and network-centric approach can be efficiently used for the problem solution is proved, since they enable designing flexible self-organizing flight programs and cargo-traffic schedules.  **Keywords:** the Russian Segment of the International Space Station, flight program, cargo flow scheduling, multi-agent technology, particular optimization criteria, scheduling rules and constraints, domain ontology, network-centric approach.  Р. 32-46 |
| **6** | **PROBLEM STATEMENT OF ADAPTIVE ENTERPRISE RESOURCE PLANNING IN MULTI-AGENT APPROACH**  ***I.V. Mayorov***  Software Engineering Company "Smart Solutions" Ltd.  17, Moskovskoye shosse, Samara, 443013, Russia  Business Center "Vertical", office 1201  The problem statement of adaptive multi-criteria enterprise resource planning is considered. The paper demonstrates that one of the reasons for the gap between the expected and actual planning results is constraints of the traditional approaches to enterprise management and production capacity planning. The high labour intensity of the planning process isdemonstrated and requirements to systems of efficient resource allocation in real-time mode are specified. The mathematical problem statement of resource allocation while planning is formulated; every resource may have its own criteria (resource cost schedule, productivity, time limits, prime cost, risks, etc.), the importance of the criteria being capable of changing during the task realization. The paper suggests taking the multi-agent approach to the principle of planning system development based on the multi-agent platform of the SEC “Smart Solutions”.  **Keywords:** multi-criteria optimization, multi-agent technology, resource management, dynamical planning, real time.  Р. 47-55 |
| **7** | time-optimal control of batch induction heating  process with respect to maximum temperature  restriction  ***A.V. Popov, A.I. Diakonov***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The paper deals with the problem of time-optimal comtrol of batch induction heating process with respect to restriction on maximum value of temperature. Parametric optimization of time-optimal control algorithms is carried out using the alternance optimization method of distributed parameter systems, developed in Samara State Technical University. Optimization procedure is based on the 2D numerical model of coupled electromagnetic and thermal fields, built in finite-element software Cedrat FLUX.  **Keywords:** induction heating, optimal control, time-optimal, technological requirement, maximum temperature restriction, alternance method, numerical model, coupled electromagnetic and thermal fields, Cedrat FLUX.  Р. 56-68 |
| **8** | SIMULATION MODELING THE TASK OF CONSTRUCTING SYSTEM TIME SYNCHRONIZATION  A.S. Raguzin, N.G. Gubanov  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The authors continue to research the time-scale information- systems synchronization to solve the problem of maintaining the same time at the power facilities of the regional grid company.The paper describes the simulation modeling techniques of monitoring the work of the time-synchronization system based on the NTPsynchronization. A discrete-event model developed in the AnyLogic computer modeling is presented, which allows the system to identify the bottlenecks and to evaluate the measures for their elimination. On the basis of the selected initial data for the model, we conducted several experiments, including those on the system optimization. The results of the computer simulation allow to select the optimum number of devices for the time-synchronization system to contain or that of system managers to maintain it.  **Keywords:** system time synchronization, simulation modeling, discrete-event model, management, monitoring, experiment, optimization, anylogic.  Р. 69-75 |
| **9** | IDENTIFICATION OF THE IMPULSE RESPONSE FUNCTION OF A LINEAR DYNAMIC SYSTEM BASED ON CORRELATION METHOD USING SIGN-ANALOG STOCHASTIC QUANTIZATION  V.N. Yakimov, V.I. Batichev, А.V. Mashkov  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The paper describes a new approach to solving the problem of statistical identification of the impulse response function of a linear dynamic system, which is based on the correlation method using a sign-function analog-stochastic quantization of input and output signals. Sign-function analog-stochastic quantization allows to pass from processing the multi-bit digital samples of input and output signals to processing the integer time samples determined by the change of the result value of thequantization type in question. The main result is the development of numerical algorithms for sequential calculation of the impulse response function discrete samples. This algorithm does not require preliminary direct estimates calculation of the system input signal correlation function and input and output signal cross-correlation function.  **Keywords:** statistical identification, dynamic system, random process, sign signal, time readout, sign-function analog-stochastic quantization.  Р. 76-84 |
| **10** | OPTIMIZING THE PLACEMENT ELEMENTS OF RES BASED  MULTILEVEL GEOINFORMATION MODEL  A.K. Grishko  Penza State University  40, Krasnaya st., Penza, 440026, Russian Federation  When designing the board assembly is one of the important tasks on which depends the reliability and performance of the product is the optimal placement of elements in a given area. It should take into account a set of interrelated parameters such as resistance element to mechanical stress, heat, electromagnetic compatibility. Unlike the task trace interconnections, for which there are well-known, proven solutions to the problem of locating elements are no solutions that address the complex above parameters. This paper considers the model of integrating external impacts on the structural components of radio electronic equipment for the problem of determining the optimal layout of elements on the printing unit. Proposed multi-layered GIS model that takes into account the thermal, mechanical and microwave exposure.An algorithm that allows you to get the optimum layout for the selected criteria board assembly.  **Keywords:** board assembly, optimization, mechanical effects, thermal effects, microwave, mathematical modeling.  Р. 85-90 |
| **11** | Elastic anisotropy front bearing spindle UNIT lathes  ***A.F. Denisenko, M.V. Yakimov***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The paper presents the results of the investigation into the effect of the mounting-surface form deviations of the shaft and the hollow in the spindle-unit front-bearing housing on its elastic properties. A method and a technique of controlling the spindle-unit stiffness of lathes using a loading device allowing to determine the spindle-unit static radial stiffness when changing the load vector direction are offered. A spindle front-bearing elastic-deformations hodograph obtained by using the method and technique in question confirmed the presence of the bearing spindle-unit stiffness significant anisotropy. The results obtained revealed the dominant factor in the formation of the bearing elastic deformations.The presented method and technique of machine- tool spindle-unit stiffness control, as well as the loading device capable of changing theforce vector direction have shown their efficiency, effectiveness, as well as sufficient ease of implementation which is most favorable for use under operational conditions in the manufacture of measuring-instrument parts.  **Keywords:** parts of measuring instruments, lathe spindle, the elastic properties, the anisotropy of the elastic properties, the load device, finite element method, the hodograph deformations.  Р. 91-99 |
| **12** | **THE USE OF INVERTING THE INPUT SIGNAL TO REDUCE  THE TIME MEASUREMENT OF HARMONIC SIGNALS PARAMETERS**  ***V.S. Melent’ev, E.E. Jaroslavkina, E.V. Pavlenko***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  A new method of measuring the parameters (RMS of voltage and current, active and reactive power) by the harmonic- signal instantaneous values which provides the measurement time reduction is considered. In contrast to the methods known which are based on the formation of additional voltage signals, identifying the moments of signal zero crossings, and comparing their instantaneous values, the method realization eliminates modulo errors of the phase-shifting units. A block diagram of the information-measuring system implementing the method is offered. The results of the analysis of the system error due to the actual signal deviation from the harmonic model are given. The results obtained allow to select the appropriate equipment depending on the measurement accuracy requirements.  **Keywords:** harmonic signals, instant values, additional signals, phase-shifting units, harmonic model, an error.  Р. 100-108 |
| **13** | System of fusion of ice on wires of powers line without loading switching-off  A.A.Bazarov, A.I. Danilushkin, V.S.Osipov  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  A set of issues on modelling the thermal processes in power lines during ice melting, and on the calculation of voltage losses in a line is treated. A simplified algorithm taking into consideration the state of aggregation change is offered for the solution of the problem. On the basis of the analysis of the network electric regimes during melting, a conclusion is drawn that the approach offered can be used in 10 and 35 kV networks of a certain length.  **Keywords**: a convective heat transfer, fusion, voltage losses.  Р. 109-117 |
| **14** | **THEORETICAL AND EXPERIMENTAL STUDIES OF THE INDUCTION-RESISTANCE HEATER FOR THE DESTRUCTION OF SMALL-CALIBER**  **AMMUNITION**  P.A. Baskakov 1, A.B. Kuvaldin2  1OJSC “Scientific-Research Institute of Mechanization of Krasnoarmeysk”  8, Prospekt Ispytateley, Krasnoarmeysk, Moscow Region, 141292, Russia  2National Research University “Moscow Power Engineering Institute”  14, Krasnokazarmennaya, Moscow, 111250, Russia  The results of study induction-resistance heater for destroying small-caliber ammunition using mathematical modeling coupled electromagnetic and thermal processes. Using specific winding wire with a stainless steel shell requires selecting the most optimal aspect ratio and parameters of a multi-layer wire winding, providing the required parameters for a stable heat localizer destruction of ammunition. The geometry of the structure and the presence of non-linear functions in the distribution of electromagnetic and thermal fields do basic research tool numerical models that were given in order to simplify two-dimensional formulation.  **Keywords:** induction-resistance heater, the destruction of ammunition, blast suppressor, multilayer coil, mineral insulated stainless steel sheathed cable.  Р. 118-127 |
| **15** | FEATURES OF INDUCTION HEATING FOR THE DEFORMATION  L.S. Zimin, A.S. Yeghiazaryan  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  Considered the features of design and operation of the induction heating systems of metal treatment under pressure. Focuses on the application of induction heating to rolling and pressing in the industries. Particularity of the design and operation of the inductors at industrial frequency in single-phase and three-phase version was shown. Was made the analysis of distribution of active power along the length of the three-phase inductor. Describes the main causes of deteriorating the uniformity of heating of billets. Highlights the issues of electro-magnetic compatibility powerful induction units with electricity supply system.  **Keywords**: inductor, design, edge effects, uniformity heating, energy efficiency.  Р. 128-135 |
| **16** | IDENTIFICATION OF PARAMETERS SYNCHRONOUS GENERATOR WITH PERMANENT MAGNETS BY MAGNETIC FIELD NUMERICAL SIMULATION  Yu. V. Zubkov, Ed. G. Chebotkov  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  *In the paper the inductor dissipation factor and armature reactances of a permanent-magnet excitation synchronous generator are determined by magnetic-field numerical simulation. The patterns of the magnetic fields generated by the inductor and the armature windings are given. The distribution of induction in the centre of a non-magnetic gap is shown. The effect of PM dissipation and the ratio between the armature winding reactances lengthwise and widthwise on the generator characteristics is estimated.*  ***Keywords:*** *generators with excitation from the PM, inductor dissipation factor, armature winding parameters.*  Р. 136-141 |
| **17** | STABILITY ANALYSIS OF POSITIONAL SERVO ACTUATOR TAKING INTO ACCOUNT THE DISCRETENESS OF THE ZERO-ORDER EXTRAPOLATOR  V.E. Lysov, I.S. Sidorov  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The Kotelnikov-Shennon theorem proves the possibility of data recovery from digital signal if the sampling frequency is the frequency of discrete elements is more or is equal to the doubled sampling frequency . This is true if sampling frequency has limitations. However, in real systems, with a tend to infinite value the effect of Aliasing is shown, which distorts the information. In this regard, the influence of discrete digital system introduces an additional error, which degrades the system specifications. The purpose of the paper is to analyze the impact of discreteness brought by an extrapolators of a zero order as a part of automatic control system on the system error.  **Keyword**: the period of discreteness, the zero-order extrapolator, digital system, indicators of control guality.  Р. 142-148 |
| **18** | INFLUENCE OF THE trapezoidal FORM OF THE VOLTAGE ON MAGNETIC FIELD ROTATION IN ALTERNATING CURRENT ELECTRIC MOTORS  ***A.V. Starikov, D.Yu. Rokalo***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The modulators providing quasi-sinusoidal modulation are considered and allowing to receive the trapezoidal form of phase voltage on stator windings of alternating current electric motors. It is shown that such modulators considerably simplify technical realization of frequency converters and reduce their switching losses. Influence of the trapezoidal form of the voltage on size of the module and rotation speed of a vector of the stator flux linkage of the electric motor is investigated. It is shown that application of considered modulators leads to non-uniformity of rotation and a module variation of flux linkage of the alternating current electric motor. It is noticed that to the minimum value of the module there corresponds a maximum of instant rotation speed of the stator flux linkage vector.  **Keywords:** the frequency converter, the trapezoidal form of the voltage, the alternating current electric motor, the voltage vector, the flux linkage vector.  Р. 149-153 |
| **19** | THE INFLUENCE OF RESERVOIR PERMEABILITY  HETEROGENEITY ON FILTRATION OF RESERVOIR FLUID  TO PRODUCTION WELLS  E.V. Andriyanova, V.I. Astafiev  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The steady-state flow process of incompressible fluid to the system of production wells in horizontal reservoir of constant height and permeability is considered in this paper. There is a thin area in the reservoir with constant permeability kf, which models highly permeable cracks or low permeability barrier. The characteristic of filtration process for various kf value is studied, well productivity index and the analytical expression for skin are defined.  **Keywords:** fluid filtration, highly permeable cracks, low permeability barriers, well productivity index, skin.  Р. 154-161 |
| **20** | efficient strategies for OPERATION OF PRODUCTION  complex «induction heating – metal hot forming»  ***А.А. Afinogentov, М.Yu. Derevyanov***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The paper discusses the strategy of output at the industrial complex "Induction heating – Metal hot forming", which includes an induction heating unit and a hydraulic press. Production costs are considered as the main efficiency indicators of the industrial complex. For fixed costs the dependence of energy consumption to produce a unit of output is analyzed. It was found that the strategy of maximum output rate and minimal power consumption are competitive. On the basis of the analyzed strategies are formulated and solved the problem of optimal control of production complex.  **Keywords:** induction heating, metal hot forming processes, energy efficiency, performance.  Р. 162-167 |
| **21** | МАTHEMATICAL MODELING OF THE PRESSURE DISTRIBUTION IN A MOVING FLUID BASED ON ELECTRO − HYDRAULIC ANALOGY  ***S.V. Kolesnikov, А.N. Branfileva, L.S. Abisheva, А.V. Fedotenkova***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The mathematical and computer model of heating network for Samara District heating system powered from Samara TPP is developed. The electro-hydraulic analogy based on two Kirchhoff's laws that are applied in the calculation of electrical networks is used.In contrast to known methods of mathematical modeling of hydraulic processes based on electro-hydraulic analogy, in this study we applied a method of automatic identification of the model which allows to perform close approximation to real network hydraulic resistance.This approach, despite the complexity of calculations, provides a model which differs from the actual heating system by not more than 3-5%, depending on the number of experimental data used in carrying out the identification. Performed research allowed to develop the recommendations for changing of the operation modes of heating systems as well as calculate the optimal plans for their reconstruction and the construction of new sites.  **Keywords:** heating networks, electro-hydraulic analogy, mathematical and computer models, the laws of Kirchhoff, graph theory, the identification of a computer model.  Р. 168-179 |
| **22** | EXPERIMENTAL STUDY OF HEAT- AND MASS-TRANSFER DURING CONDENSATION OF STEAM OUT OF AN AIR-STEAM MIXTURE IN A VESSEL WITH VERTICAL CONTACT GRIDS  M.S. Lesukhin, D.A. Kriuchkov, L.G. Grigoryan  Volga NIPITEK Ltd.  52/55, Ulyanovskaya/Yarmarochnaya St., 11th floor, Room 27, Samara, 443001, Russian Federation  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The results of experimental study of heat- and mass- transfer during condensation of steam mixed with inert gas (air) in a non-adiabatic vessel with vertical contact grids are given in the paper. Piping and Instrumentation Diagram of the laboratory unit is described. The limitations of formally proposed analytic method of study in case of condensation in a vessel with vertical contact grids are analyzed. New classification of hydrodynamic and heat exchange zones in a condenser with vertical contact grids is proposed based on the temperature curves from the results of the experiment. Low effect of inert gas on condensation heat transfer coefficient in a vessel with vertical contact grids is compared in a diagram form to the same effect in case of a horizontal tube and shell and tube heat exchanger.  ***Keywords:*** *condensation, heat transfer coefficient, air-steam mixture, vessel with vertical contact grids.*  С. 180-187 |
| **23** | The solution of problem of dissolution and utilization bottom sediments in tanks for oil at refinery  V.A. Pilschikov1, Yu.V. Yeremina1, V.S. Tsvetkov1, A.A. Pimerzin1, O.V. Shvetsov2, O.A. Belov3  1Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russia  2 Rosneft, Sofiyskaya Embankment  26/1, Moscow, 115035, Russia  3Syzran Refinery  1, Astrakhanskaya st., Syzran, 446009, Samara region, Russia  Various petrochemicals and refined products have been tested as a solvent for dissolution of asphalt, resin, and paraffin deposits in tanks for oil and oil products. Experiments have been carried out with tree different dissolution techniques, which is most likely industrially applicable. Basic guiding principles were formulated for selection of available and efficient solvent for the removing of asphalt, resin, and paraffin deposits. A possibility of involving dissolved deposits of asphalt, resin, and paraffin into refinery process have been considered as a step-ahead solution. Efficient technique of asphalt, resin, and paraffin deposits dissolution have been chosen and recommended for use in industry.  **Кeywords:** asphalt-resinous paraffin sediments, tank, solvents, utilization.  Р. 188-194 |
| **24** | PATTERNS AND STAGES OF FORMING A PROTECTIVE LAYER OF CO2-CORROSION PRODUCTS OF LOW-ALLOY STEEL WITH 1% CR  Е.А. Borisenkova, M.K. Ionov  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The paper presents the results of laboratory tests of samples of steel with 1 % Cr in CO2 containing a model solution. In a comprehensive study of the morphology and chemical composition of corrosion products, as well as measurements of the basic parameters of the model medium revealed the main stages of the formation of the protective layer of corrosion products on steel with 1% Cr. Moreover, thanks to the result, described staging carbon dioxide corrosion on steel with 1% Cr. The main results are presented in three dependencies: 1) isolating the iron ions Fe2+ in the solution to give an idea of the discreteness of corrosion in the laboratory; 2) saturation of corrosion products with chromium – is the main factor in the formation of protective properties of corrosion products; 3) the change of the corrosion rate. Comparison of the data has led to understand the dependencies, whereby a change in the corrosion rate and saturation of the effect of corrosion products chromium compound on their protective function.  **Keywords**: carbon dioxide corrosion, corrosion, corrosion rate, low-alloysteelpipe.  Р. 195-200 |
| **25** | Weld formation at electron beam welding of corrosion-resistant heat-resistant steel 06Cr15Ni6Mo1W1V1Nb1 of 9 mm thick  ***S.L. Isaev***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  The influence of the modes of electron beam welding corrosion-resistant heat-resistant steel 06Cr15Ni6Mo1W1V1Nb1 9 mm thick on the formation of the welds and the tendency to form defects such as pores and slag inclusions was investigated. Welding was performed with technological lining thickness of 5 mm at different values of the beam current and the focusing lens current. To assess the quality of welding each of the samples was subjected to X-ray inspection, cutting and metallographic investigation with the definition of the parameters of welds, microhardness and the presence of defects. The obtained values of the welding parameters for a butt joint provide the required quality and size of the weld.  **Key words:** electron-beam welding, corrosion-resistant heat-resistant steel, welding speed, microhardness, the optimal welding conditions.  Р. 201-207 |
| **26** | **STUDYING OF INFLUENCE OF PRECURSORS ON STRUCTURE  AND PHASE COMPOSITION OF NANOSIZED CeO2 SYNTHESED  BY SOL-GEL METHOD**  A.A. Kravtsov, A.V. Blinov , M.A. Jasnaja, N.S. Semenova  North-Caucasus Federal University  Russia, 355035, Stavropol region, Stavropol, Kulakova st., 2  The synthesis of nanosized CeO2 was performed by sol-gel method. Studying of structure and phase composition of the obtained samples was carried out with X-ray diffraction and IR-spectroscopy. Studies have shown that obtained ceria nanoparticles having face-centered cubic crystal structure. The crystallinity of the samples increased with increasing temperature of calcination. IR spectroscopy showed the presence of chemically and physically bounded water in samples dried at a temperature below 250 ° C. Desorption of the bounded water and the decomposition of cerium hydroxide take place during drying at temperatures above 250 ° C. The dependence of the particle size of the precursor used was investigated.  **Keywords**: CeO2 nanoparticles, sol-gel method, X-ray diffraction, infrared spectroscopy, particle size.  Р. 208-213 |
| **27** | **ABOUT EXPANSION ADDENDAMS RELATIVISTIC DYNEMICS  TO ELECTRIC CIRCUITE**  ***V.S. Lyapidov***  Samara State Technical University  244, Molodogvardeyskaya st., Samara, 443100, Russian Federation  On the basis of community of mathematical model processors in electrical and non-electrical slow-response elements the possibility of principle expansion addendums of relativistic dynamics to electric circuit is considered. Technical capability of approximate realization of correlations by convention limit current value by means of inductor and voltage on the condenser by the use of negative-inductor and negative- condenser converter is shown.  **Keywords:** inertia member, compensation setting of inertia member, negative-impedance converter.  Р. 214-218 |
| **28** | **REGULATION VOLUMETRIC EXTRUDER OUTPUT WHEN APPLIED  CABLE INSULATION**  V.N. Mitroshin Samara State Technical University, 244, Molodogvardeyskaya str., Samara, 443100, Russian Federation  Questions of automation of processes of isolation of wired communication cables were considered in this article. It is shown that for quality management of overlay polymer insulation on the conductor, necessary to provide stabilization of regime parameters of technological equipment as accurately as possible. The main parameter of control of the process of insulation invited to choose volumetric output of the extruder, which indirectly assess by diameter insulated conductor measured immediately after the cable head.  **Keywords:** cable manufacture, isolation, extruder, volumetric productivity, automation.  Р. 219-222 |