ABSTRACTS

Zakharov A. V., Lebeshkov M. E., Zakharova I. V. Dynamic Equation for Well Sucker Rod Pump Units for Oil Production

The derivation of a dynamic equation for the well sucker rod pump unit for oil production is presented. Based on the calculation for the dynamic equation the curves of sucker displacement are obtained related to the number of pumpings of rocker machine.

The analysis of the sucker displacement curves shows that when the number of pumpings exceeds 3 an abrupt reduction of the coefficient of pump stroke length is observed resulting in a considerable reduction of the well sucker rod pumping unit actual capacity.

Pinchouk V. V. Building Block Diagrams of Modular Control Hydroblocks Based on Morphological Tables

One of the main parts of hydraulic drive is the control hydroblock the operation of which determines the performance of the entire hydraulic drive. The object of engineering synthesizing of various control hydroblocks is the search for a structural approach and the selection of optimum variant from multiple alternatives.

It is proposed that the stages of structural synthesizing be performed in a preset sequence including: selection of elementary diagrams and transforming them into topological models – graphs, then building elemental block diagrams, then building general structural model of the control hydroblock. Elemental block diagrams are build based on binary matrices and morphological tables of engineering designs.

Ostricov O. M. Stressed State of a Nano-Sized Twin Nucleus with a Point Source of Expansion Inside

The methods of calculating stress fields for nano-sized twin having the shape similar to a lens are proposed. The influence of the point source of expansion or total dislocation on stressed state of the twin nucleus is studied. It is established that the presence of the source of expansion or total dislocation results in re-distribution of cleavage stresses which is favourable for the process of twinning dislocation generation.

Valitskaya O. M., Selitskaya M. P. Technological Characteristics of Metal Chips

Technological characteristics of metal chips are defined required for the development of the processes of recycling. Particularly fractional composition, bulk density and angle of repose are established for various types of aluminum and cast-iron chips. Porosity, sum coefficient of polydispersity, form factors for various elements of chips and other are defined. The values of speed of carry-over for particles of different sizes and forms at various temperatures of heat flow are obtained. Changing the characteristics of cast iron chips during heating in rotary tilt furnaces are analyzed.

Data obtained was used in rotary tilt furnace designing and in the development of design plans and specifications.

Ostricov O. M., Kouznetsova O. S. The Influence of Plasma Cutting Conditions on Microstructure, Microhardness and the Quality of Carbon Steels Working

Optimum conditions providing high quality of plasma cutting are defined. It is established that increasing plasma cutting speed contributes to the reduction of the amount of collars affecting the quality of working. However at cutting speeds of over 450 mm/min the quality of working is improved quite insignificantly. Therefore to improve the quality of working it is not necessary to considerably increase cutting speed. With the cutting speed increase the size of the grain in specimens worked is reduced, which contributes to increasing their microhardness which is much higher in power worked surface than in the bulk of a specimen.

Neverov A. S., Prikhodzko I. V., Pavlenko A. P. The Influence of External Factors on the Process of Corrosion of Aluminum Alloy AD–31

The process of corrosive destruction of AD–31 alloy under the action of acid and alkali media and also in the presence of hardness salts is considered. The mechanism of corrosion of aluminum alloy under the action of more electropositive metals and in the presence of external electric potential is studied.

Pinchouk V. V., Andreev S. F., Parkhomenko A. V. Designing Modular Control Hydroblocks Components of Hydraulic Drives of Technological Machines

For designing modular control hydroblocks being the main part of the drive of technological machine unified functional blocks of the BF type are used. The BF blocks are developed based on standardized hydraulic apparatuses, and the unification of their mounting dimensions is achieved by means of adapter plates, fastened to a butt plane of each apparatus that considerably deteriorates the figures of specific material consumption and power intensity of control hydroblocks.

The problems of optimum designing modular control hydroblock components based on the methods of Pareto are considered in the paper. A general criterion of efficiency of control hydroblocks is formulated including the following parameters: volume, area of outer surface and hydraulic pressure losses. The criterion was studied following which the dependence of the functional on the number of components in a control hydroblock was obtained and also parameter priority. Pareto diagrams are built establishing the relation between the volume and the area of hydroblocks.

The data obtained enables to optimize geometrical parameters of modular control hydroblocks components.

Komnatny D. V. Electrostatic Field Calculation in Endless Cylinder Grounded Sheath

A variant of the method of equivalent electrodes is proposed adapted for calculating two-dimensional electrostatic fields in screened cables. In this case coefficients relating the charge and the potential of equivalent electrodes can be obtained by the method of reflection in a circle (inversion) according to Kelvin. This enables to reduce the dimensionality of the matrix of coefficients. The method of calculating radii and coordinates of equivalent electrodes for circular cylinders is described. Numerical experiment data is presented showing that the method of calculation ensures minimizing the number of calculation errors and reaches approximating solution with small error.

Fikov A. S. Modeling Electric Power Consumption of Oil Transport System Allowing for Outdoor Temperature

A statistical model of electric power consumption of the oil line sector has been developed including oil turnover and outdoor temperature as variables. The model obtained can be applied to working out electric power consumption rates for the system of oil transport.

Grountovich N. V., Alferov A. A., Kolesnikov P. M. Typical Errors in Vibration Diagnostics of Power Equipment

Quite a number of methodological and organizational – technical faults occurring in the process of technical diagnosing by specialists of an industrial enterprise are analyzed. This in its turn has an influence on measurement errors: experimental, methodic and human, which substantially reduce diagnostics data adequacy. Recommendations are also given on reducing a large number of errors in the process of diagnosing, though insufficient theoretical knowledge and practical experience can make it difficult to avoid such errors in full measure.

Roudchenko Y. A., Saveliev V. A., Samovendiuk N. V., Tolstenkov A. A. Starting Asynchronous Motor for Self-Oscillation Operation

The ways of starting three-phase asynchronous motor to self-oscillation operation are considered. Relay switching circuits are developed and the expression for defining switching angle required for starting is obtained. Possible fields of application for these ways of starting are proposed.

Yegorenkov N. I., Starodoubtsev I. E., Starodoubtseva M. N. Methodological Problems of Financial Economic Statistics

The study of classical statistics («equivalent» independent events, «normal» distribution law) and fractal statistics («non-equivalent» events, power distribution law) has been conducted. Mandelbrot's hypotheses of the existence of several forms of randomness (statistics) and their analogy with the states of aggregation of matter has been considered. It is shown that more reasonable is the analogy of the statistics forms with «equilibrium» and «non-equilibrium» states of a dynamic system (particularly matter). The statistics of equilibrium states of dynamic system is suggested to be divided into two different forms: statistics typical for the systems in the steady state of stable equilibrium or phase (homogeneous systems, classical statistics) and statistics typical for the systems in the state of unstable equilibrium corresponding to a first kind phase transition (heterogeneous systems, fractal statistics). A suggestion has been made that the intermediate form of statistics according to Mandelbrot corresponds to a non-equilibrium state of systems analogous to a glassy state of matter and also to compacted disperse systems (jammed matter state). The proposed correlation of statistic forms with the states of dynamic systems enables to predict specific features of stochastic behavior of a system to select an appropriate mathematical mechanism for processing its stochastic parameters.

Yermalinskaya N. V. Transport-Production Model of Optimizing the Operation of the Processing Enterprise of the Dairy Branch of Agroindustrial Complex

The transport-production and economic-mathematic model of optimizing raw material area and the structure of dairy production at the processing enterprise is presented. Major basic statements, possibilities and fields of application of the model in management practice are considered.

Optimization model enables to scientifically substantiate the parameters of raw material area at the processing enterprise minimizing transport costs of the delivery of raw material from the suppliers, and also to define an optimal structure of dairy product production in accordance with the existing and expected consumer's demand level minimizing technological costs of raw material processing during the production of various kinds of products.

Klimov D. O., Drozd S. S. Methodologic Approaches to Defining the Category of Competitiveness

The problems of methodologic approaches to defining the category of competitiveness are considered. The experience of home and foreign authors, different points of view concerning the category of competitiveness are studied and analyzed. Weak points of existing approaches are revealed. The substantiation and characteristics of these drawbacks are presented. Appropriate conclusions and recommendations on their elimination are proposed and also recommendations concerning further development and improvement of these approaches.