

УДК 536.2.01

Shablovsky O. N., Salinkova M. G. Thermal Oscillations and Waves in Locally Non Equilibrium Medium with a Nonlinear Energy Source

Analytical algorithms for solving two-dimensional equations of locally non equilibrium heat transfer in the medium with the nonlinear energy source are presented. An exact solution in the class of dual waves of finite amplitude is obtained. Possible existence of relaxing thermal processes with divergent perturbations of quasi-analytical type is established. Equations of nonlinear thermal oscillations in the system «medium – energy source» are obtained.

УДК 539.375

Tarikov G. P., Borodachev N. M., Komrakov V. V., Akulova E.M. The Solution of the Problem of Wheel and Rail Contact for the Case of Elliptic Contact Area

Contact problem for a «wheel – rail» system is considered. During the determination of the stressed and strained state contact surface of wheel and rail are substituted by elastic half-spaces based on Hertz hypothesis. The solution of static boundary problem for the half space is obtained. In addition the formulas for defining the components of displacement vector and stress tensor are obtained. This enabled to obtain an integral equation for the assigned problem. The solution of this equation is considered for the case of elliptic contact area of wheel and rail contact. A numerical example is considered, contact stresses, approach and contact area dimensions for car wheel tread and rail R65 are obtained.

УДК 621.941.025-182.26

Michailov M. I. Analysis of the Influence of the Parameters of Replaceable Indexable Inserts on Dimensions of the Tool Tooth

Mathematical model describing the influence of the shape and arrangement of replaceable indexable inserts in the body of cutting tool on the dimensions of cutting tooth of cutter, milling cutter and axial tool is proposed.

УДК 620.178.16; 620.178.3

Popov V. B., Drobyshevskii P. S., Komissarov V. V. The Development of Friction Torque Measuring Device for SI-04 Fatigue Wear Test Stand.

The device developed for rolling friction torque measuring for pre-production model of fully prepackaged SI-04 stand is described. The procedure of its adjusting and calibration is presented. For experimental approbation of the device accelerated testing of power system models was conducted. Consequently it was established that the units of the stand are operable, keep preset parameters with allowable error and provide measurements of the characteristics under test (friction torque) with high accuracy and reliability.

УДК 548.24

Ostricov O. M. Field of Elastic Deformations and Displacements in the System of «Wedged Nano Twin and a Chain of Perfect Dislocations»

A model of the system «wedged nano twin – perfect dislocation» is developed. Based on this model the calculation of the field of displacements and dislocations is conducted. It is shown that the chain of perfect dislocations makes more significant contribution in a strained state of a solid body than the nano twin. It is conditioned by the fact that power of Burgers vector of chain dislocations is greater than power of Burgers vector of imperfect twinning dislocation. The model enables to calculate strained state at various arrangements of the dislocation chain relative to wedged twin, which allows to simulate the situations of perfect dislocation generation at the twin boundary or at its peak which often occurred during the experiment

УДК 621.7.043:621.785

Stepankin I. N., Kenko V. M., Pankratov I. A. The Influence of Diffusion Hardening on Deformation Characteristics of High Alloy Steels

The influence of the conditions of thermal pre-treatment combined with chemical-thermal treatment on the structure and technological plasticity of high speed R6M5 steel is studied.

The possibility of significant increase of material plasticity at deformation «by hardened layer» in cold is shown. The value of technological plasticity due to combining carbonizing with the operation of cyclic annealing reaches 40 %, which is 2 times greater than the same figure for carbonizing combined with dead annealing.

Plasticity values obtained enable to develop technological process of making stamping tools with sophisticated pattern molding surface using blanks having pre-hardened surface provided prior to its shaping.

УДК 539.6:666.151

Khilo P. A., Zlotnikov I. I. Allowing for Molecular Interaction in Developing Wedging Liquids for Glass Cutting

The behavior of wedging liquid in main crack formed during glass cutting is analyzed based on Lifshits electromagnetic theory of intermolecular interaction of condensed bodies. Approximate formula for calculating the forces of interaction of glass surfaces divided by the main crack is proposed. It is supposed that the main contribution in the force of interaction is made by electromagnetic interaction at wavelengths occurring in optical range. In this case the main parameters defining intensity of interaction of glass surfaces of the crack, divided by a gap filled with liquid are refraction factors for glass and liquid.

Based on specific liquids taken as the examples applicability of the formula proposed is shown for predicting the efficiency of these liquids in glass cutting. The composition of novel composite liquid for sheet technical glass cutting is proposed.

УДК 665.65

Pavlenok A. V., Poddenezhny E. N., Boiko A. A. Specific Features of Nanostructured Oxide Powder Preparation with the Use of Microwave Radiation

The analysis of functional powder material preparation methods by the use of microwave energy is conducted. The synthesis conditions are optimized and structural and phase characteristics of ultra disperse powdery samples of zinc oxide, copper oxide and yttrium oxide activated by ions of rare earth elements are studied. The analysis of structural and morphological characteristics of materials obtained with the use of the methods of X-ray diffractometry, optical, electronic microscopy and IR-spectroscopy is conducted.

УДК 681.518.54:004.65

Chaus O. V. The Formation of Database and Knowledge Base in Operating Systems of Electrical Machine Technical Diagnosing

The methods of the formation of database and knowledge base in the systems of electrical machine technical diagnosing are presented: semantic networks, relational database, frame-based models, presenting knowledge as samples or products. Their functioning is illustrated, including concrete examples. Their comparative analysis is conducted. It is shown that most efficient instruments of database and knowledge base formation are products, frame models, samples and semantic networks.

УДК 332.13:001.895

Sorvirov B. V. The Model of National Innovation System: Structure, Functioning and Management

The role and the functions of national innovation system in the formation of modern economy of the Republic of Belarus are considered, the necessity of the formation of the con-

ception of developing such a system is substantiated. The algorithm of national innovation system management is proposed, its institutions and their functions are considered. The role of the Chamber of Commerce and Industry of the Republic of Belarus in the formation of national innovation system is shown.

УДК 338.552

Borisevich I. V. Analysis and Major Lines of Improving the Process of Selecting a Product for Manufacture

Based on the study of theoretical-methodological principles major approaches were developed to estimating commercially profitable consumer goods, applicable for manufacturing at industrial enterprises of the Republic of Belarus and also to predicting their market prices taking into account their quality. Then on the basis of the analysis of practical activity of industrial enterprises the approbation of data obtained was conducted. Using the analysis results basic lines of improving the process of selecting products for manufacture are defined. Due to the application of the methods proposed for the management of new product manufacture commercializing the level of consumer satisfaction with enterprise products will increase on the one hand and on the other hand available potential will be used more efficiently which will result in the increase of competitiveness of the industrial enterprise.

УДК 338.33:67

Naumchik A. A., Bolomchouk B. V. Mechanism of Organization-and-Diversification Agroindustrial Complex Enterprise Management

Economic nature and substance of the system and mechanism of managing vertically integrated and horizontally diversified organizations of agroindustrial complex enterprises are revealed. Characteristics of basic elements of the management of organizations mentioned are given namely principles, objectives, goals and functions of management. The model of functioning of mechanism and business process of managing vertically integrated and horizontally diversified agroindustrial complex organizations.

УДК 351.84+364.322

Alexeenko N. A., Kravchouk E. B. Economic and Legal Mechanism of Professional Risk Assessment Applied for Identification of Dangerous Industrial Units

The problem of risk is one of the key problems at each stage of life cycle of economic entities. The object of professional risk management is establishing interrelation and interconnection between the elements of the system (people, and/or departments, individuals within the organization and with external environment) providing the process of the formation of safe working conditions, and also social and economic relations in the process of functioning of the system of industrial accident insurance and industrial disease insurance. Characteristics of existing approaches to professional risk identification are given, present day legal aspects of labor protection in the Republic of Belarus are considered, critical analysis of the methods of professional risk assessment is conducted. In the structure of the paper basic lines in developing unified methodological approaches to the evaluation of working conditions at working places are emphasized: unification of risk-management terms during professional risk identification; enhancement of insurance company role in industrial risk management; implementation of the activities of governmental goal-oriented program on improving working conditions and labor protection for 2011–2015; upgrading the mechanism of economic interest of economic entities in improving working conditions and labor safety; formation of data bank on working conditions in the organizations of the country.