

In the matter of discussion

**FUNDAMENTAL TRIAD OF KNOWLEDGE AND VOLUME PERIODICITY
IN STRUCTURE OF PHYSICAL-CHEMICAL ELEMENTS**

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ABSTRACT

The paper covers fundamental triad of knowledge within the system “Substance – Energy – Information” as a basis for development of idea of universal periodic LT-model of structure of physical-chemical elements by Yury.A. Galushkin, perspectives of creating instruments for observation of homeostatic states of new materials of technosphere and biosphere of VI wave of innovation

**THE INVESTIGATION OF THE RESISTANCE OF WELD OVERLAY FOR
SEALING SURFACE OF PIPING ACCESSORIES UNIT**

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ABSTRACT

The resistance of EnDotec*DO4 weld overlay to the steel 12X18H10T is investigated for wear resistance increase of accessories' sealing surfaces under the conditions of high pressure and temperature in hydrogen service.

**PAKT-04: DEVICE AND NON-DESTRUCTIVE TESTING OF HEAT-EXCHANGE
EQUIPMENT**

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ABSTRACT

JSC "IrkutskNIIhimmash" designed a device PAKT-04 for detection of defects on the pipe inner surface using the method of acoustic pulse reflectometry (APR). The article describes the principles of device operation and the experience of device application under the industrial conditions for examination of heat exchangers. It is noted that the device has a high effectiveness of testing while detecting defect pipes in the bundle, it is easy and convenient to use.

**MATHEMATICAL MODELING OF DYNAMICAL VIBRATING
INTERACTION PROBLEMS OF MECHANICAL SYSTEMS WITH «NOT
HOLDING» TIES**

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ABSTRACT

At the present time vibration interaction is used for development of new technological processes in which required quality of product is provided due to interaction of the granular medium with the vibrating surface. Article is devoted to development of mathematical models and estimation criteria form of movement with influence of unilateral ties in dynamic interactions of elements of vibration technological processes in the application to problems of increase in reliability and quality of operation of vibration machines. The study is focused on the formation of theoretical ideas about the dynamic interactions of a solid body with the vibrating surface based on the development of mathematical models by introducing of additional external forces and elastic ties with unilateral contact, including mathematical models of gapless movement of the compounded solids. In terms of practical applications the task is to develop and approve experimentally the opportunities of the measuring devices fixing the modes of continuous tossing. The generalized approach to problems of dynamic synthesis of the vibration technologies realized in the modes of continuous tossing at introduction of additional forces is developed. A basis of approach is to introduce the concept of the function of a gap allowing to prove creation of forms of movements of material particles according to the certain criteria reflecting properties of trajectories of the movement of material particles in interaction with the vibrating surface. Mathematical models for definition of conditions of formation of dynamic reactions in the oscillatory structure consisting of several elements connected among themselves including with opportunities of their preliminary pressing due to elastic connections and power factors are offered. The measuring device fixing the modes of continuous tossing is developed and experimentally approved.

**METHOD OF STRUCTURAL TRANSFORMATIONS IN IDENTIFICATION
OF DYNAMICAL RESPONSES IN MECHANICAL OSCILLATION SYSTEMS**

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ABSTRACT

Method of definition of responses of ties in vibroprotection systems which compose of protection object and vibroprotection devices (VPD) is offered. In simplest form VPD is presented in view elastic elements which can be joined dissipative links and devices for motion transformation, including lever mechanisms. Is shown that VPD can to have rather complicated structure. Wherein the responses at the entrance and at the exit VPD may coincide if VPD composition hasn't of massinertial elements with independent coordinates of movement. Otherwise, the

dynamic response of ties at the inlet and at the outlet will be different that is depend on the features of the inertial forces which generated by movement of the intermediate elements. The essence of the method lay in that at using of structural models in the form of structural schemes which equivalent in a dynamic relation of automatic control system, it becomes possible to separate the protection object in the form of a integration links of second order. In this case dynamical response of ties is interpreted as negative feedback. Coefficient of gain of tie corresponds to a coefficient of rigidity of the mechanical system which formed as a result of structural transformations. Statical responses define on same algorithmical base at "zeroing" of complex variable with taking into account the location constantly operating forces. Full response of ties define as the sum of static and dynamic components. Examples of transformations and applications are given.

PARAMETRIC IDENTIFICATION OF HIGH-VOLTAGE POWER LINES

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ABSTRACT

Initial parameters of high-voltage power lines (hereinafter – HVPLs) are determined with errors up to tens of percent. Adjustment of HVPL parameters' determination accuracy can be fulfilled with the use of parametric identification methods. These same methods can be used to acquire a mathematical model of HV power line that would be adequate to real conditions. The parametric identification is performed with the use of complex values of current and voltage measurements on both sending and receiving sides of the line. The existing methods of parametric identification were developed for single-lined models and can't be used for the problems of modeling asymmetric states, especially in cases of complex asymmetry. In this article a new approach to the problem of HVPL parameters' identification is proposed. This new approach is based on the use of phase domain and complex values of current and voltage measurements on both sending and receiving sides of the line. The method is based on preliminary calculations of mutual capacitive conductance and partial mutual impedances with further calculations of other parameters with the use of current and voltage measured values. This method was proven applicable for real-rife problems of HVPL parameters' determination. Applicability was proven by computer simulation with the use of software package "Fazonord" developed in Irkutsk state transport university.

INNOVATIVE TECHNOLOGIES OF "MIKHAILOVSKY PROCESSING PLANT" TO IMPLEMENT RUSSIAN ORE BASE DEVELOPMENT STRATEGY

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ABSTRACT

This paper gives a scientific basis and the basic trends of the development and introduction of high-tech large-scale production of iron ore in the Russian Federation, implemented by Mikhailovsky processing plant. The main idea of this paper is the implementation of an integrated system of high-tech innovative projects allowing to dramatically increase the scale of the mining production due to the involvement of large volumes of poor, refractory, off-balance ores in the processing without the need of any additional production capacity.

THE CHLORINE BALANCED SCHEMES OF NATURAL GAS AND ROCK SALT COMPLEX PROCESSING INTO POLYMERS

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ABSTRACT

The article is dealt with different schemes of producing polymers from the main component of natural gas - methane. The most attractive schemes are based on using natural gas and the resources of rock salt. The manufacturing of polyvinylchloride, polycarbonates and polyurethanes can be organized in a unified complex as they have common streams like methane, chlorine, synthesis gas, methanol, propylene, benzene, toluene, hydrogen chloride.

DESIGNING MANUFACTURING-TECHNOLOGICAL SYSTEMS

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ABSTRACT

Any production enterprise is an integrated set of manufacturing-technological systems. In its turn a manufacturing-technological system (MTS) is a minimum integrated set of tangible (fixed assets) and intangible assets providing output products and/or its technological stages having market cost. Our research showed that this fact is a necessary condition ensuring competitive advantages of end products at external market. To implement this task the production process of an enterprise should be organized on the basis of transferring consumer properties and operating costs to zones of financial responsibility that are technological stages. Designing MTSs consists of two stages. At the first stage the structure of operating costs is designed according to the Tax Code of the Russian Federation. The main parameter determining economic benefits of the manufacturing process is net income that consists of net profit, depreciation of tangible assets for simple reproduction and amortization of intangible

assets for extended reproduction of a MTS. Operating processes based on management accounting are developed at the second stage of designing MTSs. In this case the main managing parameter is the gradient of productivity of operating processes. Entropy method has been created to estimate the value of manufacturing capital and to design the parameters of manufacturing-technological systems.

INNOVATIVE APPROACHES TO THE TECHNICAL STATE RATING OF THE MAIN FUNDS OF INDUSTRIAL PLANTS

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ABSTRACT

This article is dealt with the approaches that the specialists of JSC "IrkutskNIIhimmash" use while providing safe operation of the equipment, buildings and facilities of chemical plants and petroleum refineries.

NANOCOMPOSITES BASED ON HYBRID ORGANO-SILICATE MATRIX

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ABSTRACT

This paper examines water-soluble high-modulus silicate systems' properties and production techniques, how these systems transform from lower to higher oligomers as well as formation of silica sol and of the sol-gel processes for these oligomers. The authors explore in-depth the different aspects of using these materials as a binder and modifiers for manufacturing of hybrid nanostructured composites through sol-gel processes, as well as features of their structuring, synthesis and application of hybrid materials based on silica with grafted polymers. Production of nanostructured silica polymer concrete serves as an example of the application of such silicate systems. Modification of compositions with nanostructuring agents as tetrahydrofuryloxysilane and an aqueous dispersion of chlorosulfonated polyethylene and other polymers are studied. The paper also describes the ways of modification products sol-gel synthesis by polyurethanes. It covers application of the sols for production of the hybrid nanocomposite monolithic blocks and fire-resistant materials and techniques for producing of the new nanocomposite acid-resistant materials and linings for corrosive environments.

**POLYMER NANOCOMPOISITES
WITH HIGH RESISTANCE TO AGGRESSIVE ENVIRONMENT**

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ABSTRACT

Coating application is one of the traditional methods of protecting materials against corrosion. Polymeric materials for structures and coatings are increasingly dominating corrosion-protection technology. The most effective method of improving protective properties is to reduce the permeability of coatings due to the change in the molecular and meta-molecular structures of the material and the use of additional components reducing the rate of diffusion of electrolytes in polymers and anti-corrosive silicate compounds. We have proposed the set of inorganic substances of composite polymeric materials which selectively interact with the water or water solutions of acids, salts, and alkalis in order to decrease their penetrability and increase their chemical resistance simultaneously.

**WAVES OF INNOVATION, AND SUSTAINABLE DEVELOPMENT OF INDUSTRY,
ON AN EXAMPLE OF CONSTRUCTION**

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ABSTRACT

On the occasion of the 25th Anniversary of the Russian Academy of Engineering (RAE), a historic retrospective review is presented, to show development of applied technological novelties in construction industry. The proposed analysis makes it possible to obtain a deeper understanding of the principles of gaining, by countries and peoples, of technological leadership in resource saving, energy efficiency, independence from import, and all types of technological and ecotechnological safety.