Summaries

UDC 514.76

E.T. Ivlev, E.D. Glazyrina
DISTRIBUTION OF TWO-DIMENSIONAL PLANES IN THE FOUR-DIMENSIONAL EUCLIDEAN SPACE

The mappings of the two-dimensional planes L_2^1 and L_2^2, which are invariantly connected with the distribution of two-dimensional planes in the four-dimensional Euclidean space have been viewed. Each of mappings is determined by two corresponding functions of two arguments. Therefore for their analysis the harmonic functions and known conditions of Cauchy-Riemann are used. All considerations have local nature, and the functions met in the article, are supposed to be analytical.

UDC 541.123.012:546.79:661.879.402

I.I. Zherin
FLUORIDES OF HALOGENS IN THE NUCLEAR FUEL TECHNOLOGY. THERMODYNAMICS OF PHASE BALANCES IN THE SYSTEMS CONTAINING UF_6, BrF_3, IF_5 AND HF

The phase balances of binary and treble systems containing hexafluoride of uranium, fluorides of hydrogen, chlorine, bromine and iodine have been studied. It has been established, that it is possible to separate these systems into pure components using the methods of crystallization, distillation, purification and sorption - desorption.

UDC 552.57: 551.464.679

S.I. Arbuzov, A.V. Volostnov
THE FORMS OF THORIUM CONCENTRATING IN CARBONS

The forms of thorium occurrences in peat, brown and hard coal of Siberia have been examined. Using the method of neutron-activation analysis, the distribution of Th in the fractions of grouped composition of peat and brown coal has been studied; the balance calculations have been performed. It has been established, that in peat and brown coal 50 ... 78 % of metal is concentrated in humic acids. In hard coals with the low carbonization degree (rank D) the significant amount of thorium is contained in residual humic substances. Th contents in coal fractions of various densitiy have been studied. It has been determined, that in coals of different ranks and ash content varying from 10 to 93 % Th is contained in the fraction <1, 6 g / см^3.The stepwise demineralization of hard coal by concentrated acids (HCl and HF) results in accumulation of thorium bulk in residual coal. The data obtained from the correlation analysis and electron microscopy allow to conclude, that the basic mineral form of occurrence of thorium in mature hard coals are rare earth phosphates.

UDC 553.98

G.Y. Boyarko
APPLICATION OF NUCLEAR – PHYSICAL METHODS FOR THE ANALYSIS OF PHOSPHATE ORES ON THE FIELDS OF SOUTHERN YAKUTIA

For occurrence and exploration of the Southern Yakutia phosphate ores gamma - spectrometric mapping of thorium, fluorometric neutron-activation mapping and X-ray radiometric cerium analysis have been used. For the large-scale occurrence of apatite ores aerogamma- spectrometric mapping, and for the surface detailed occurrence X-ray radiometric analysis of lithogeochemical cerium tests have been recognized the most effective. To control the traversing quality of the Southern Yakutia phosphate fields it is recommended to use neutron-activation methods to determine phosphate concentration based on the content of fluorine.

UDC 552.322+553.411.071

I.V. Kucherenko
MINERALOGICAL AND PETROCHEMICAL FEATURES ASSOCIATION OF BASIC HYPABYSSAL ROCKS OF THE BERIKUL ORE FIELD

The structure, mineral and chemical compositions are adduced; the petrochemical dike parameters of basic igneous rocks of five generations whose formation preceded and accompanied ore-formation are analyzed. Dikes belong to the class of moderately alkaline olivinic dolerites and are composed of the rocks of three types: moderately alkaline olivinic (olivine-containing) dolerites and leukodolerites as well as odinites singled out by convention. Dike composition evolves from dolerites and leukodolerites at the beginning of active fluid-magmatic activity at the pre-ore stage to leukodolerites in the process and at the end of this activity. The multi-event intrusion of basic moderately alkaline melts was alternated with the intake of hydrothermal ore-forming solutions. The conclusion was drawn on generating melts in the mantle focus of basalt magma, differentiated prior to the formation of dike association in the direction of some increase in its alkalinity and silicon acidity. The facts indicating the fluid-admissing role of dikes at the ore formation stage and their formation as well the formation of fields on the abyssal levels are discussed.

UDC 624.131

V.V. Kramarenko
THE CHARACTERISTIC OF PEAT SOILS OF THE GREAT VASYUGAN BOG (THE INTERFLUVE BAKCHAR-IKSA-SHEGARKA)

The investigation results of the water-physical and deformation properties of the peats of the Western part of the Great Vasyugan bog are adduced. The interrelations between the indices of peats compression and their composition and condition characteristics have been revealed. The method to forecast the deformation of peat compression has been suggested.

UDC 624.131

L.A. Strokova
THE CHARACTERISTICS OF LOESS ROCKS OF TOMSK REGION

The new materials concerning the composition and physical-mechanical properties of the covering rocks of Tomsk region are adduced. The statistical data processing has been carried out. For each soil type the correlation dependences of the general deformation module and strength properties from the grain composition, the porosity coefficient, humidity, etc have been obtained. The suggestions on compiling the regional table of normative and computational indices of the mechanical characteristics of rocks are adduced.

UDC 550.4.43:666

E.B. Golushkova, T.A. Sagachenko, V.N. Burkova
THE NATURE OF NEUTRAL NITROGEN-CONTAINING COMPONENTS OF THE LIPIDS OF RECENT CONTINENTAL SEDIMENTS

The paper contains the data on the composition of neutral nitrogen-containing components of lipids of recent sediments, using the lake Utichie-3 (Khakasyia, Eastern Siberia) as an example. It has been established that they are represented by aliphatic amides and tetrapyrrol pigments.

UDC 628.16:543.42:556.3

V.I. Otmakhov
THE METHOD OF ESTIMATION OF AQUEOUS BASIN ECOLOGICAL SAFETY ACCORDING TO BOTTOM DEPOSITS POLLUTION

The chemical-spectral technique to estimate the state of the aqueous basin of the Siberian region according to the bottom deposits pollution is represented, the self-purification model for ponds of different types is suggested.

UDC 533.9.07, 535.9.082.5

V.A. Vlasov, V.F. Myshkin, I.A. Tikhomirov
DETERMINATION OF THE DISPERSION OF THE CONDENSED PHASE OF HETEROGENEOUS PLASMA

The paper describes the mount for the diagnostics of the heterogeneous low-temperature plasma. The experimental data are adduced on determining granulometric composition of the condensed-phase plasma for burning of pyrotechnic compositions.

UDC 535:6 21.373:541.124.16

V.P. Tsipilev, V.M. Lisitsyn, V.I. Korepanov, V.I. Oleshko, A.N. Yakovlev
ON THE ISSUE OF FIRING MECHANISMS OF HEAVY METAL AZIDES USING THE METHOD OF LASER MONOPULSE RADIATION

The paper states the generalized results of experimental investigations of the kinetics of explosive decomposition of heavy metal azides when exposed to laser pulse excitation within the broad time slot, including induction period, fast explosive decomposition and dispersion of detonation products. It has been demonstrated, that the thermal model most fully matches the experimental results and adequately mirrors the processes of explosive decomposition stimulated by the laser beam. The analysis of potential firing mechanisms of heavy metal azides has been performed.

UDC 66.047.545:614.833.001.25

A.I. Sechin, V.Y. Yashin
INFLUENCE OF THE IGNITION-SOURCE REHEAT TEMPERATURE ON THE VALUE OF THE LOWER CONCENTRATION LIMIT OF THE FLAME SPREAD IN AERODREDGES

The investigation results are presented concerning the influence of the initiating-ignition-source reheat temperature on the value of the lower concentration limit of the flame spread (LCLS) in aerodredges. It has been experimentally proven that there exists a certain initiating ignition source reheat temperature at which LCLS is observed. It has been found out that for every initiating-ignition-source reheat temperature there exists a special particle size for which the minimal value of LCLS is realized.

UDC 541.16:182

A.A. Gromov, A.P. Ilyin, V.I. Veretschagin
INVESTIGATION OF THE PROCESS OF ELECTROEXPLOSIVE TUNGSTEN NANOPOWDER OXIDATION IN THE AIR

The process of passivation and the products of the subsequent air oxidation of tungsten nanopowder (a_s ~100 nm), obtained by the method of electrical explosion of conductors have been studied. It has been shown that air oxidation of tungsten nanoparticles goes through several subsequent stages with the participation of the lower oxide W_3O. The oxidation products of W nanopowder have been studied by electronic microscopy, x-ray photoelectronic spectroscopy, x-ray diffraction, differential-thermal analysis, high resolution transmission microscopy. The scheme for chemical processes of air oxidation of tungsten particles is suggested.

UDC 621.762

O.B. Nazarenko
INFLUENCE OF THE SYNTHESES CONDITIONS ON CHARACTERISTICS OF THE ELECTRIC EXPLOSION NANOPOWDERS OF METAL CARBIDES

This paper presents the investigation results of the phase and chemical composition of nanopowders, produced by electric explosion of tungsten and aluminum conductors in the condensed hydrocarbons, and hard paraffin. It has been stated that the density of the working medium and dynamic viscosity facilitate the increase in the output of carbide phases saturated with carbon. The investigation results of the products of electrical explosion of tungsten conductors have revealed the possibility of obtaining superfine nanopowders of tungsten carbides characterized by the maximum of particle distribution according to their size within the range of 20...60 nm.

UDC 621.311.22:621.039

V.S. Loginov, I.P. Ozerova
ASSESSMENT OF NON-STATIONARY HEAT EMISSION AT THE FILM VAPOR CONDENSATION ON THE VERTICAL WALL

The calculated dependences of the heat emission coefficient, velocity and the transcendental equation for the thickness of condensation laminar film which are true for the regular heating rate have been obtained.

UDC 669.86:536.21

G.V. Kuznetsov, M.A. Sheremet
SIMULATION OF THE SPATIAL HEAT TRANSMISSION IN THE CLOSED SPACE WITH THE LOCALLY CONCENTRATED SOURCES OF HEAT-GENERATION

The spatial non-steady heat transmission task for the composite parallelepiped with the locally concentrated sources of heat-generation and non-homogeneous boundary conditions has been accomplished. The method of finite differences and the non-uniform difference grid have been used. The conclusion has been drawn on the substantial difference of the temperature fields in the cross-cuts going through heat-generation sources

UDC 536.2:532/533; 532.516

A.V. Krainov
MATHEMATICAL MODELING OF THE CAVITY-OF-OPEN-TYPE DETERIORATION WHEN INTERACTING WITH THE SPOUT OF VISCOUS FLUID UNDER THE HIGH-TEMPERATURE HEAT-MASS EXCHANGE

The computational investigation of the adjoint heat exchange and hydrodynamics at the viscous fluid flow in the open rectangular plain is carried out taking into account its breakdown process. The hydrodynamic patterns of viscous flow in the cavity under its breakdown and the temperature fields for solid and liquid phase are obtained. The impact of the dynamic parameters and geometrical adjectives on the formation of emerging craters circuits is investigated.

UDC 621.436

V.V. Gavrilov
PHYSICAL SIMULATION OF THE FUEL SPRAY DEVELOPMENT AS A BASIS OF IMPROVEMENT OF CARBURETION AND COMBUSTION IN THE DIESEL

The novel method of the experimental investigation is described; the experimental data concerning the mass distribution and the traverse speeds of the fluid gas and accompanying gas along the length of the developing jet of the diesel injector are given. These data are utilised for improvement of the mathematical model of the processes in the diesel cylinder. The calculation results concerning the improved model are represented.

UDC [546.162.13+546.162.15]: 544.344.016

I.I. Zherin, V.F. Usov, R.V. Ostvald, R.V. Kalaida, G.N. Amelina, N.B. Egorov
THE BALANCE BETWEEN CONDENSED PHASE AND VAPOUR IN THE SYSTEM UF_6–BrF_3

The balance between condensed phase and vapour in the system UF_6-BrF_3 has been studied. The dissolubility areas UF_6 in BrF_3 at temperatures from 283,15 to 333,15 K are determined. The positive declination of the system from the Raul law is shown; the comparison of the obtained experimental data with the literary ones concerning the liquid-solid balance is carried out.

UDC 621.357.2.035.4 (088.8)

V.M. Belyaev
THE MECHANISM AND KINETICS OF THE ELECTRODE PROCESSES AT THE ELECTROLYSIS OF MELT KF·nHF

This paper suggests the mechanism of the electrode processes of the electrolysis of melt KF·nHF accompanied by several simultaneous reactions on the cathode. First there occurs the discharge of ions H^+ or $H_nF_{n-1}^+$ and then, after the relevant voltage is achieved, ions K^+ participate in gassing of hydrogen. The fundamental result of electrolysis is guaranteed by the oxidation of ions $(HF)_nF^-$ on the anode up to molecular fluorine, and on the cathode by the disoxidation of the ionic complex $K^+(HF)_nF^-$ with the development of the molecular hydrogen. The mechanism is proved by the thermodynamic analysis of probable integral electrochemical reactions and confirmed by the theoretical concepts of the electrolytes electroconductivity, and explains the abnormal phenomena of the KF·nHF electrolysis. The design data of the equilibrium voltages of the most probable integral electrode reactions providing the main result of the KF·nHF electrolysis are equal to 3,51 V for KF·2HF at temperature 363 K and to 3,13 V for KF·HF at temperature 523 K.

UDC 543.272.2

V.V. Korobochkin, V.I. Kosintsev, D.V. Konovalov, E.A. Khanova
THE METHOD OF QUANTITATIVE DETERMINATION OF OXIDATED METAL AT THE ELECTROLYSIS BASED ON THE ALTERNATING CURRENT

The method of quantitative determination of oxidated metal at the electrolysis (corrosion) on the alternating current based on the measurement of volumetric content of the liberated hydrogen is proposed. The installation diagram, description of operation and the corrosion kinetic curves obtained for various metals are given.

UDC 669.2:66

M.G. Shtutsa, A.V. Kardapolov, V.B. Filippov, N.A. Sysina
INVESTIGATION OF THE CERIC OXIDE CHARACTERISTICS

The impact of various factors acting within the process of the ceric carbonate concretion on the structure of the ceric oxide obtained by their calcination at 500 and 1000 °C is investigated. The possibility of the generation of the ceric oxide with the large coverage suitable for the catalyst manufacturing is shown.

UDC 666.1.022.8

N.S. Krasheninnikova, O.V. Kasmina, I.V. Frolova
THE FEATURES OF THE MECHANISM OF THE GRANULES FORMATION IN GLASS MIXTURES

The features of the mechanism of the granules formation in glass mixtures representing a polydisperse components mix of different nature are examined. The physico-chemical processes connected with the dissolution and crystallization of the chemicaliy active mixtures' components form the basis for the mechanism of granules formation. These concepts concerning the mechanism of granules formation allow directly influence the separate stages of the process with the purpose of obtaining granules with the given processing characteristics.

UDC 629.05:681.787:535

S.M. Slobodyan
TRACKING OPTICAL PHASOMETER

The principle of tracking optical phasometer with the phase discriminator of the error signal of the fringe position is proposed. Optimization of the phasometer parameters by the data of the functioning quality extremum is carried out. The practical approbation results are given.

UDC 681.3.01

O.G. Berestneva, O.V. Marukhina
COMPUTER TECHNOLOGIES FOR THE QUALITY ASSESSMENT OF EDUCATION

The topicality of the research is determined by the necessity to develop and introduce new measuring methods and data processing algorithms for evaluating the quality of teaching the students of Tomsk Polytechnic University, to perform further research in the field of quality evaluation and management at the University; and to develop and improve the present system of quality management. The main investigation within the research is aimed at elaborating new models and algorithms for the quality assessment of different components of the education process.

The information technology based on the expert-statistical algorithms is developed. The elaborated system algorithms have a software implementation and are introduced into the teaching process at some Tomsk universities.

UDC 338.242.4

L.M. Anokhin
THE THEORETICAL APPROACHES TO THE ANALYSIS OF THE STATE REGULATION OF ECONOMY

The present stage of the Russian economy development is characterized as a transitive one with its inherent features and regularities. The characteristic feature of this process is the radical change of the State's economic role. The state regulation of economy emerges as a natural result of the market economy evolution, the way of solution of contradictions, overcoming the market "failures". The ideas, mentioned in the article, are especially urgent for our country. The economic science is responsible for the choice and realization of such model of the country's economic development, which satisfies the national interests.

UDC 65.012.2

S.L. Eremina
INTERNATIONAL CAPITAL MARKET: CONCEPT AND STRUCTURE

Different approaches used by various economic conceptions for the analysis of the international capital movement are investigated in the article. The conclusion is as follows: none of the existing conceptions can be absolute, but the theory of institutional economics seems to be the most acceptable.

UDC 008.2

L.A. Korobeynikova
THE PHILOSOPHICAL ASPECTS OF GLOBALIZATION

The paper presents new interpretation of the globalization. In the recent social and philosophic theory there exists a popular point of view which interprets the globalization as empirical unification of local communities and cultures. However, this article covers the globalization not only on an empiric, phenomenal level of its manifestation but also on an internal, noumenal level.

On the internal level the local and the global have common roots in the civilization progress, and represent social reply to the civilization's evolution. Such approach offers an opportunity to produce a nonconventional interpretation of the history of humankind civilization and presents it as a process of self-organization of human communities in time and space.

The motive force of civilization's development is an accumulated energy which consists of material and immaterial complexes dependent on consumed energy obtained from natural resources available on the occupied territory. Development of civilization is connected with territoriality as basis of flourishing of civilization. The process of civilization's assimilation of new territories in forms of expansions, displacement of people, wars, and conquests leads to formation of oligarchical tendency, which results in the merge of the local communities into the universal organization with centralized authority (globalization). The local tendencies of the development of communities (localization) are opposite to the process of globalization whence it follows disintegration of the global communities (disintegration of the great empires in history of culture, for example, the Ancient Rome; disintegration of the Soviet Union in modern times).

Globalization and localization indicate community unification and disintegration trends and coexist with one of the given trends to be predominant on a certain lapse of time. Thence the modern positions of acceptance or negation of globalization (radical globalism, moderate globalism, anti-globalism) happen to lack scientific justification. Globalization (in spite of existing interpretations of this phenomenon as of universalism, multiculturalism, interculturalism, and so on) represents a social response to the tendencies of civilization's disintegration, decay and degradation. The alternative tendency – localization – periodically replaces globalization and acts as social response to the tendencies of unification and integration of communities under the guidance of the dominating community. Globalization and localization carry out the function of social regulators of the process of the civilization energetic balance-disbalance.

On the modern stage of development the laws of the unification and disintegration of communities are expected to be accelerated, hence the pulsations of globalization and localization are to be speeded up.

UDC 008.2

S.K. Ashvanyan
RUSSIA WITHIN THE ECONOMIC GLOBALIZATION

In the article the author makes an attempt to define the essence of globalization regarded as an economic category. Different approaches to the definition of globalization are considered. The most typical features of this phenomenon, its merits and demerits are underscored.

On the basis of the analysis of globalization taken as an economic phenomenon does the author try to make conclusions applicable to the Russian economic policy. Attention is drawn to the necessity of adequate reaction to the world capitalist challenge. The author also accentuates that the absolutization of market principles discredits the idea of globalization. He concludes about the necessity of attracting special attention to social aspects and contradictions of globalization in order to minimize the negative after-effects of this process.

UDC 001:1

V.E. Budenkova
SOME FEATURES OF MODERN METHODOLOGY

This article considers changes of methodology caused by the development of methodology itself. Author defends the view that the modern science has transformed our conceptions of truth, rationality, objectivity, but it doesn't mean that these features are lost. Today dynamic rationality becomes the form of reason, relevant to the reality and allows to interpret the fundamentals of science in a new fashion and integrate it into the social-cultural context.

UDC 165

V.G. Lankin
LOGIC OF AN EVENT AND METAPHYSICS OF BEING: PHENOMENAL ASPECTS AND CATEGORIES

In this article the possibilities and peculiarities of categorical logic of an event are analyzed on the modern level of scientific development. It is said that a new class of categorical logic gives us the possibility to unite theories of different ontological levels and interpret universal regularities in an adequate way. Meta-theoretical logic is not metaphysics of being but phenomenology of an event, where being is constituted. In this case some categories such as uniqueness, structure and sense take a cardinal meaning. These categories don't express ontological relations. They express inner indication of event, where reality is opened in its immanent co-ordination.

UDC 373.5

E.I. Sladkov, S.I. Kuznetsov
ORGANIZATIONAL AND PEDAGOGICAL BASIS OF THE MULTILEVEL PREUNIVERSITY TRAINING PROVIDED BY THE SCHOOL OF NATURAL SCIENCES AT THE TPU CENTER FOR PREUNIVERSITY TRAINING

Differentiated multilevel preuniversity training is one of the crucial steps towards educational activity progress. It makes the efficiency of educational process grow and guarantees good level of knowledge for the learners, namely TPU students-to-become.

Multilevel training pursues making the educational process individualized and differentiated and forms one of the features of the School of Natural Sciences set by the TPU Center for Preuniversity Training.

UDC 55(09)

L.Y. Erofeev
PROFESSOR D.S. MIKOV, FOUNDER OF THE SIBERIAN SCHOOL OF GEOPHYSICISTS – PIECES OF BIOGRAPHY

On November, 19–21 Tomsk Polytechnic University hosted the All-Russia Scientific Conference dedicated to the centennial anniversary of the birth of Dmitri Stepanovich Mikov, the founder of the Siberian School of Geophysicists and department of geophysics at TPU. The conference participants reported on the topical matters of investigation of the Earth's interior geological pattern, prospecting, exploration and development of mineral deposits and ecological issues. Scientists from all the former Soviet Union territory from Gomel' to Yuzhno-Sakhalinsk and from Noril'sk to Tashkent were eager to participate in the conference and this large-scale attention to professor D.S. Mikov is by no means fortuitous.

UDC 556.314(092)

N.M. Rasskazov, J.G. Kopilova
PAVEL AFANASEVICH UDODOV – FOUNDER OF THE SIBERIAN SCHOOL OF HYDROGEOCHEMISTRY

The paper covers the history of hydrogeochemical research at Tomsk Polytechnic University and most important milestones in the life of Pavel Afanasevich Udodov, the founder of the Siberian School of hydrogeochemistry.

UDC 55(09)

S.I. Kuznetsova
PRIVATE OFFICE–MUSEUM OF V.A. OBRUCHEV

October 2003 witnessed the 140th anniversary of the day of birth of Vladimir A. Obruchev, an outstanding Russian scientist and explorer of the Siberian and Asian territory. His name makes an inseparable property of the history of Tomsk where V. Obruchev lived for nearly 11 years from July 1901 till March 1912 and history of TPU (the then Tomsk Technological Institute) where he worked in the course of this period.

Inspired by the idea of commemorating pedagogical and scientific successes of academician V.A. Obruchev, at the geological department in 2000 TPU established a memorial personal office – museum dedicated to him and his disciple M.A. Usov.