Summaries

UDC 514.76

V.K. Barysheva, E.T. Ivlev

ON THE EXISTENCE OF HARMONIC AND ANALYTICAL QUADRATIC REFLECTIONS OF TWO-DIMENSIONAL PLATFORMS OF THE LAYERS OF TANGENT AND NORMAL FIBRATION OF MULTI-DIMENSIONAL SURFACE IN EUCLIDIAN SPACE

The paper presents the cases when harmonic f_r and analytical f_a reflections of two-dimensional planes L_2^1 и P_2^1 are invariantly determined on the multi-dimensional surface of the general type in Euclidian space. These planes belong to the corresponding layers of tangent and normal fibration of the given surface.

UDC 514.76

E.A. Moldovanova

CANONICAL BENCH MARK OF ONE-PARAMETER FAMILY OF TWO-DIMENSIONAL PLANES IN FIVE-DIMENSIONAL SPACE

The paper deals with one-dimensional family of two-dimensional planes in equiaffine space A_5. All the elements of the constructed canonical bench mark are given full analytical and geometrical interpretation. Besides, the paper views invariant clothing of this family. All the considerations are of local nature.

UDC 519.2:621.391

N.S. Dyomin, S.V. Rozhkova

ON THE STRUCTURE OF INFORMATION AMOUNT IN THE JOINT FILTERING AND INTERPOLATION PROBLEM USING MEMORY OBSERVATIONS. GENERAL CASE

This paper considers the problem of the finding Shannon's information amount in the joint filtering and interpolation problem of the stochastic processes based on continuous-discrete time memory observations. The ratios are obtained that define the time evolution of Shannon's information amount in the form of decompositions in which the information amount for separate tasks of filtering and interpolation are clearly distinguished.

UDC 532.58

I.V. Dudin, R.K. Narimanov

RESISTANCE DURING ELLIPSOID SLOW MOVEMENT

Based on the application of transformation of simple expansion – compression, the paper deals with the technique of distribution of solutions of problems connected with the flow of incompressible viscous fluid at the presence of a sphere, into variants when the sphere is replaced by the three-axial ellipsoid. The problem of ellipsoid's slow flow is solved; the simple design formula for its resistance is given. The satisfactory coincidence with reference data corresponding to extreme cases is shown.

UDC 536.46

K.O. Sabdenov

ON FINDING MARKSTEIN'S CONSTANT

Using the example of the simple model, the paper shows that combustion equations can be solved with biased values of temperature and concentration of the substance present in the combustion reaction. The flame speed is determined unequivocally; and Markstein's length appears to be significantly longer than it has been proposed earlier. This allows expanding substantively the domain of hydrodynamical stability according to Reynolds number.

UDC 539.2:669; 539.219.3

N.N. Nikitenkov, I.P. Chernov, Yu.I. Turin, L.N. Puchkareva

ISOTOPIC EFFECTS UNDER TECHNOLOGICAL INFLUENCE ON SOLIDS SURFACE. Part 2

The following paper deals with research results and new experimental data concerning isotopic composition change in near-surface layers of solid bodies during ion sputtering, ion dispersion, secondary ionic emission, ion implantation, electrolysis saturation with hydrogen isotopes, and external thermal diffusion. These processes reveal obvious changes in natural isotope prevalence both in the composition of near-surface layers and secondary (emitted, reflected) particles. The research is conducted using secondary ionic mass-spectrometry and secondary ionic power-mass-spectrometry on the samples of molybdenum, copper implanted nickel, on various titanium modifications, thin-film titanium-aluminum systems, and others. Common behavior patterns of isotope composition change in different processes are revealed. Possible mechanisms of their change are discussed.

UDC 669.24/.295:539.25

I.A. Kurzina, I.A. Bozhko, M.P. Kalashnikov, S.V. Fortuna, V.A. Batyreva, I.B. Stepanov, Yu.P. Sharkeev

HIGH-INTENSITY IMPLANTATION OF ALUMINUM IONS INTO NICKEL AND TITANIUM

The elemental composition and the structure-phase state of the ion-modified surface layers of nickel and titanium targets are investigated. The high intensity ion implantation of the aluminum ions into nickel and titanium was carried out using the vacuum-arc ion beam and *Raduga-5* plasma flow source. The modified layers with thickness up to 1000 nm (Ni) and up to 2000 nm (Ti) were formed at ion implantation. It has been established that at high-intensity ion implantation of aluminum the modified surface layers of Ni and Ti containing fine dispersed intermetallic phases of Me_3Al, MeAl (Me=Ni, Ti) and solid solutions with variable concentration depending on the depth are formed. The formation of the intermetallic phases corresponds to binary alloy diagrams Ni-Al, Ti-Al. The regularity in the localization of phases formed during the implantation process depending on the depth of ion-implanted metal layers is revealed. The correlation between the structure-phase state of the modified metals and the conditions of the implantation is established.

UDC 553.411.071:550.42(546.1+546.8)

I.V. Kucherenko

THEORETICAL AND APPLIED ASPECTS OF TITANIUM, PHOSPHORUS, MAGNESIUM GEOCHEMISTRY IN MESOTHERMAL GOLD DEPOSITS. Part 2

The paper shows the enrichment of near-ore metasomatites and the ores of Karalonskoye, Yubileinoye, Verkhne-Sakukanskoye fields of Northern Transbaikalia as well as Sukhoy Log field (river Lena Region) and numerous mesothermal gold deposits of other Earth regions by phemophile elements. The conclusion is made concerning the generation of the above mentioned and other (gold, platinoids, mercury, vanadium) phemophile fluid elements in basalt hearths of the anomalous mantle. The substance of the latter is inherited by the ores and metasomatites of mesothernmal gold deposits as well as by the gases and sublimates of the volcanoes with mantle feeding. The phosphorus and titanium anomalies occur as a result of inversion of alkaline restored mode of the fluids rising from the mantle into acidic oxidative one in the upper horizons of the earth's crust. Anomalies of phemophile elements constitute one of the features used to prove the geological-genetic uniformity of mineralization formed in carbon-slate and non-slate substrate and to ground the concept of formation of the fields of the viewed complex at the final basaltoid stage of formation of ore-producing antidromic granite-dolerite complexes. It is recommended to use phosphorous-titanium anomalies for forcasting and exploring purposes.

UDC 553.311

V.G. Voroshilov, G.Yu. Boyarko, E.I. Biryukov
GEOCHEMICAL ZONING OF THE DEPOSITS OF LEBEDINSKY TYPE (CENTRAL ALDAN)

The internal structure of anomalous geochemical fields of gold deposits of Lebedinsky industrial type widespread in Central Aldan ore region has been investigated. It has been established that gold deposits are accompanied by anomalous structures of the secondary geochemical field in whose nuclear zone Pb, Zn, Ag, Mo, Au, As and in frontal zone Ni, Cr, Co, Ti, V, Cu are accumulated. The development of anomalies of Ba and Mn. is regarded as the additional favorable feature. Ore bodies are fixed by the anomalous structures of the primary geochemical field. In their centre the association Au, Cr, Ni, Co, V, Zn, As is developed; it is replaced by Cu, Ag, Mo, As towards the periphery; and the external halo is enriched by Ba, Mn, Pb.

UDC 552.321.6+552.164

A.I. Chernyshov, E.E. Pugachyova
THE INTERNAL DEFORMATIONAL STRUCTURE OF ULTRAMAFIC MASSIF MOLODEZHNY AND ITS ROLE IN LOCALISATION OF CHRYSOTIL-ASBESTOS (MIDDLE VITIM MOUNTAIN LAND)

Foliated structure of ultramafic rocks in asbestbearing massif Molodezhny is established. Three stages of plastic deformations in rocks are distinguished. Spatial connection of chrysotil-asbestos veins with elements of the internal deformational structure of the massif is shown, formed at stages of synmetamorfic plastic flow of rocks.

UDC 550.831.05(571.1)

V.N. Ustinova, V.G. Ustinov
SEISMOMETRIC MORPHOLOGICAL ANALISIS AT THE MAPPING OF HIGH-CAPACITY COLLECTING POOLS. PART I. CLASSIFICATION OF MORPHOLOGICAL FORMS, INFLUENCE OF COLLECTING POOLS OF FACIES TYPE ON PALEORELIEF

Modern observation and interpretation methods in seismic exploration create new opportunities for geological-tectonical interpretation of seismic data. Seismometric morphological interpretation of horizon-oriented structural maps of space seismic exploration form the background for improvement of seismic-facies reconstructions, which increases the quality of forecasts of zone distribution of high-capacity collecting pools.

UDC 553.982:550.9

I.G. Yaschenko
CYCLICITY CHANGES OF SULFUR AND PARAFFIN CONTENTS IN OIL CHANGES DEPENDING ON RESERVOIR AGE

The sulphur and paraffin contents of the samples of 13300 Cainozoic, Mesozoic and Palaeozoic oils are analysed depending on reservoir rock age. The database includes 149 principal oil-bearing basins in the world. The results of the studies concerning the correlations between the distribution of oils with different sulphur and paraffin contents and the reservoir age are presented. The analysis of changes in chemical composition indices shows cyclicity and reveals some regularity. It is shown that cyclic changes of chemical properties are related to cyclicity of sea transgressions and cyclicity of changes of volumes of organic substance burial for the whole geological history of the Earth.

UDC 550.4.43:666

E.B. Golushkova, T.A. Sagachenko, V.N. Burkova
HETERORGANIC COMPOSITIONS OF FREE AND BOUND LIPIDS OF THE MODERN SEDIMENT OF THE LAKE OF CONTINENTAL TYPE.

The paper states the results of the comparative analysis of heterorganic substances contents in free and bound lipids of the modern sediment of the lake of continental type.

UDC 535.36, 535.361, 543.436

V.F. Myshkin
DEVELOPMENT OF THE DIAGNOSTIC METHODS FOR OPTICAL DENSE PLASMA SYSTEMS

The interference methods of flow separation of small-angle dispersion and of shaping of the marks for disperse particles calculation developed by the author are described in the paper. The results of the experimental studies of interaction of interference field light lines with irradiation flow diffracted on the non-transparent objects.

UDC 621.38:681.33:535.4

S.M. Slobodyan
OPTICAL TRACKING PHASOMETER WITH TIME DISCRIMINATOR

The principle of optical tracking phasometer with time discriminator signal of the soft contrast imagery optical interference is proposed, which was tested in the conditions of Gaussian distribution and Markovian model of the signal and phon. The outcome of experiment is adduced.

UDC 621.373.826

D.V. Shiyanov, G.S. Evtushenko, V.B. Sukhanov, V.D. Bochkov, V.N. Kudinov
EXPERIMENTAL INVESTIGATION OF SMALL HYDROGEN ADDITIVES IMPACT ON CUBR-LASER PERFORMANCES

The results of the experimental research of the laser on the CuBr-vapor with hydrogen additives are presented in the paper. Hydrogen was added into the charge through the special generator of H_2. It is shown that small additives of hydrogen (< 0,5 %) result in significant increase in radiation impulses frequencies, efficiency and average capacity of the CuBr-laser.

UDC 541.16:182

A.P. Ilyin, O.B. Nazarenko, S.V. Richert
INFLUENCE OF "OIL+MIXTURE OF COPPER AND NICKEL NANOPOWDERS" SUSPENSION ON A TRIBOLOGICAL BEHAVIOR OF "CARBON STEEL – LOW-ALLOY STEEL" PAIR FRICTION

The paper views the possibility of using the mixture of copper and nickel nanopowders as metal cladding admixture to engine oils. The small mixture concentration in the oil results in the decrease in the friction coefficient and temperature in friction unit, while lowering its concentration causes augmentation of temperature and friction coefficient. Besides, the increase in concentration generates cladding of surfaces of tribological situations, which impairs their amortization.

UDC 669.28:54

F.V. Makarov, G.G. Andreev, T.I. Guzeeva
PROCESSING OF METAL WASTE PRODUCTS OF MOLYBDENUM BY ELEMENT FLUORINE FLUORIDATION

The results of research of physical and chemical parameters of molybdenum fluoridation process by element fluorine are given. Thermodynamic calculations and kinetic research determine constants of the balance in the Mo-F system, constant of velocity, apparent energy of activation, limiting stages. The dependence of fractional conversion on time and concentration of fluorine is established $\alpha=f(T,c_{F_2})$, allowing optimizing the process, the choice of the equipment and the organization of a work cycle.

UDC 543.253

Yu.A. Karbainov, D.O. Perevezentseva
VOLTAMMETRY AS THE CONTROL METHOD OF THE ELECTROCHEMICALLY ACTIVATED PROBE PREPARATION CONDITION

The boundary condition for the electrochemical active form in the process of the formation of electrochemical activated state of aqueous salt solutions, the regularities of the influence of different factors on the magnitude of limit current in cathodic voltammetry and inverse voltammetry are examined.

UDC 546.562:546.175-323

A.V. Korshunov, S.V. Kovalyova, V.P. Gladyshev
INFLUENCE OF NITRIC ACID CONCENTRATION ON THE CONTENT OF ITS REDUCTION PRODUCTS DURING INTERACTION WITH COPPER

Process of copper dissolution in nitric acid of different concentration by means of kinetic method and reaction products quantitative analysis in solution and gas phase was studied. On the basis of obtained data a schema of mechanism of the reaction between copper and nitric acid has proposed.

UDC 536.16

G.V. Kuznetsov, V.P. Rudzinsky
SIMULATION OF THE PYROLYSIS PROCESS OF THE NON-TRADITIONAL SOLID FUEL IN THE STAGE OF PREPARATION FOR COMBUSTION IN BOILER PLANT

The task of temperature field of non-traditional solid fuel during the pyrolysis with the account of its structural heterogeneity and temperature differences of gas and condensed phases of the solid fuel on the whole range of the temperature changes from the initial to those, corresponding to the full completion of pyrolysis process is solved. It is determined that the temperature difference along the depth of the fuel reaches 600 K in the typical conditions of heat exchange, and maximum differential temperature of gas and condensed phase of the solid fuel layer comprises 350 K with the temperature of the external environment 1000 K.

UDC 533.6.011

V.M. Galkin
SOME EXACT SOLUTIONS OF ONE-DIMENSIONAL STATIONARY EQUATIONS OF GAS THERMODYNAMICS FOR THE UNIFORM CROSS-SECTION CHANNEL

For differential equations, describing one-dimensional stationary flow with the transition through the sonic speed, the dependences in the right parts of these equations, which allow obtaining analytical expressions for gas parameters in the channel of constant flow, are proposed.

UDC 539.3

B.P. Belozerov, B.A. Ljukshin, Yu.A. Mitrofanov, Yu.V. Osipov
GEOMETRICAL AND SOLID DESIGN OF THE WIRE SPIRAL FILTER ELEMENTS

The analysis of the influence of the mandrel form and diameter of the wire on the geometrical characteristics channels of wire filter elements is described. With the help of parametrical research variants of the definite forms and sizes of channels are obtained. Depending on the properties of the material the assessments of technical parameters of the winding process, which provide the required geometrical indexes, are obtained.

UDC 621.9.01

V.A. Pushnykh, V.L. Bibik
COMPARISON OF TWO METHODS OF THE CUTTING TEMPERATURE CALCULATION

The comparison of two cutting temperature calculation methods according to A.N. Reznikov and S.S. Silin is described in the paper. Satisfactory coincidence of calculation and experimental values of cutting temperatures is shown.

UDC 674.053:621.935:006.354

A.A. Kondratyuk, V.K. Shilko
DEFINITION OF DURABILITY OF TAPE SAWS ON CYCLIC DURABILITY

A new method is applied to define the band saws according to the State Standard (GOST) 25.504-82 taking into consideration the cyclic character of work of band saws along the alternating loads. The conclusions of the equalized linear hypothesis of summing up the fatigue damages, two-dimensional methods of processes planning of band saws loads in accordance with State Standard (GOST) 25.101-83, methods of arranging the load blocks in accordance with GOST 25.101-83 are used; applying some of them it is possible to forecast the failures of band saws as the result of ruptures. The rate of fatigue cracks growth and correspondingly the cyclic durability of the band saws is dramatically influenced by the tangential stresses, despite their insignificant level of loading.

UDC 621.316.9:620.193.7

L.D. Safroshkina, Yu.R. Gunger, V.E. Dmitriev, Yu.V. Dyomin
CALCULATION OF CORROSIVE CURRENCIES FOR THE EARTHING SYSTEM MODEL

The calculation models of corrosive currencies and potentials (voltages), which take place during the ground (electrochemical) corrosion of the underground structure, consisting of horizontal and vertical linear elements, interconnected by metal, taking into consideration the resistance of elements polarization, their resistance to diffluence and mutual resistances are presented in the paper.

UDC 621.374

Yu.K. Rybin
THE SYNTHESIS OF SELF-OSCILLATING GENERATOR SYSTEMS OF THE ELECTRIC SIGNALS

Periodic signals are widely used as testing signals in measuring technology; as a stimulus in medicine. They are used in acoustic testing of building structures, in mechanisms and machine testing, etc. Different devices and facilities are introduced, such as generators of periodic signals. Construction methods of self-oscillating generator systems for the reproduction of the simplest periodic vibrations are in common use today. However, the major objective of the synthesis of self-oscillating mathematical models has not been achieved yet. The paper reveals the stationary self-oscillation, on the basis of which combined equations can be stated, where the oscillations of the given form are regarded as the solution to the equation.

UDC 681.513.3

P.S. Gluschuk
QUALITY CONTROL SYSTEM OF THE CABLE PRODUCT MANUFACTURING

Virtual panel that reflects the technological process of cable product manufacturing in the real time scale is developed. The possibility of any specific cable parameter with the help of multiscreen treatment is implied. Fuzzy logic allowing tracing manufacturing process failures and correct operator's actions is implemented in the software.

UDC 621.311

B.V. Lukutin, S.G. Obukhov
BALANCE LOADING OF THE AUTONOMOUS HYDROELECTRIC MICROSTATION ADJACENCY

Investigation results of transient and constant conditions of power supply autonomous systems that use minor water current energy with autoballasting systems of voltage stabilization are presented in the paper. Basic electric diagram of the ballasting loading of the autonomous hydroelectric microstation that provides high quality of the out electrical parameters is suggested. The results of laboratory and industrial testing of the given device and its major technical features are mentioned.

UDC 621.313

A.I. Chuchalin, I.O. Muravlev, I.A. Safyannikov
THE INVESTIGATIONS OF IMPULSE INDUCTOR AND COMPRESSOR GENERATOR

Disk-type inductor and compressor generators are widely used as a rotary source of pulse capacity in power systems of the electrophysical devices (laser pumping sources, high voltage devices to supply power for accelerating machinery, etc.). Such generators allow obtaining generating impulse frequency from 50 to 400 Hz under 50 kV and more. Generator operation principle, its testing results under capacitive and resistive loading are presented in the paper.

UDC 553.98

G.Yu. Boyarko, V.Yu. Khatkov
FLUORINE MINERALS RECOVERY AND CONSUMPTION IN RUSSIA. PART 2

Russia is experiencing a shortage of large fragmental fluorspar, which is currently being exported from Mongolia and China. In the upcoming future Russian consumers need to maintain constant import of the fluorspar mined by *Mongolroszvetmet* joint venture in East Mongolia. Most likely the increasing demand in fluorine for chemical and aluminum industries will be satisfied by the increase in the quantity of accompanying fluorine when phosphate raw material processing and secondary usage of the cryolite at the aluminum plants.

UDC 658.50

A.B. Pushkarenko
COMMERCIALIZATION OF SCIENTIFIC AND TECHNICAL DEVELOPMENT AS A CONSTITUENT ELEMENT OF THE INNOVATION ACTIVITIES OF SCIENTIFIC AND EDUCATIONAL ESTABLISHMENTS

Analysis results concerning the commercialization of scientific and technical developments in Tomsk scientific and educational establishments are mentioned in the paper. Potential stages of commercialization of completed scientific and technical developments and their funding sources are presented.

UDC 329

L.I. Yampolskaya

CONCEPTUALIZATION OF THE IDEA OF ACADEMIC INNOVATIVE UNIVERSITY: PROBLEMS AND PERSPECTIVES

Preconditions and conceptual basis for the formation of academic innovative university caused by growing industrialization of science and some issues concerning globalization of technology and economy are considered. These processes form the basis for the development of academic innovative university. Actualization of qualitative status of the university education in the 21st century contributes to the dynamic process of reconsideration of both issues and the significance of education.

UDC 378(571.1/5):372(09)(103)

V.V. Petrik

FROM THE HISTORY OF THE INTERNATIONAL SCIENTIFIC RELATIONS DEVELOPMENT BETWEEN SIBERIAN HIGHER EDUCATIONAL ESTABLISHMENTS AND UNIVERSITIES AND SCIENTIFIC INSTITUTIONS OF SOCIALIST COUNTRIES IN THE END OF 1950TH – BEGINNING OF 1990TH

The article is devoted to the development of international cooperation of Siberian higher education establishments with the countries of the «socialist center» from late 1950-s to early 1990-s. The paper deals with issues of formation and expansion of scientific relations between higher education establishments, professional exchange in the field of joint research management, participation of scholars from Siberian universities and their colleagues from socialist counties in international conferences, symposia, and congresses.

UDC 26(47+57)

L.I. Soskovets

THE CONCEPT OF TOTALITARIANISM AS AN EXPLORATORY MODEL OF ANTIRELIGIOUS AND ANTISPIRITUAL PRACTICE

The concept of totalitarianism and the possibility of its implementation into the educational process and explanation of antireligious and antiecclesiastical policy of the Soviet government are analyzed.

UDC 37.014.5;316.33

R.B. Kvesko, L.M. Zolnikova, N.M. Pankova, S.B. Kvesko

ROLE OF THE EDUCATIONAL SYSTEM IN PUBLIC DEVELOPMENT: SOCIAL AND CULTURAL ASPECT

Educational conditions are very complicated and contradictory in today's world. On the one hand, education in the twentieth century became one of the major spheres of human activity; the enormous achievements in this area provided the basis for vast social, scientific, and technological transformations typical of the outgoing century. On the other hand, the expansion of the educational area and qualitative changes in the status of education are accompanied by many aggravating factors caused by the crisis in the sphere of education. The paper is aimed at providing a scientific basis for social and cultural aspects of modern education management.

UDC 823+17

N.A. Nikolaenko

THE PHILOSOPHY OF TRANSLATION OF PROSE AS A SEMIOTIC PROBLEM

The article deals with semiotic issues of the philosophy of translation of prose in the context of the Russian and Western cultures. Literary translation is regarded as a form of interliterary perception, where the accuracy of translation may vary due to both external and internal factors. The key factor in translator's success is the comprehension of integral logic of time and space in the narrative, which is realized on both rational and irrational levels.

UDC 531/534+530.1(075)

V.V. Larionov

NATURAL END VIRTUAL PRACTICAL TRAINING FOR PROBLEM-ORIENTED AND ELITE EDUCATION IN THE FIELD OF PHYSICS

Conceptual aspects of natural and virtual practical training for problem-oriented and elite education in the field of physics are considered in the paper. Specific stages and elements of the structural training scheme and the examples of teaching technology are presented.

UDC 001:061.91

V.M. Lisitsyn

THE DEPARTMENT OF LASERS AND LIGHTING ENGINEERING

The history of foundation and development of Laser and Light Engineering Department is presented in the paper. Founded in 1970, the department is one of the leading research and educational establishments of Tomsk Polytechnic University.

UDC 001:62

V.D. Yevseev, S.Ya. Ryabchikov, P.S. Chubik

THE ROLE OF TPU DRILLING DEPARTMENT IN DEVELOPMENT OF MINERAL RESOURCES OF TOMSK REGION

The contribution to the development of the mineral resources of Tomsk region made by the scientists and graduates of the Drilling Department of Tomsk Polytechnic University is described. The paper is dedicated to the 400th anniversary of Tomsk, the 200th anniversary of Tomsk Gubernia, and 60th anniversary of Tomsk Oblast.

UDC 62:1/3(09)

V.G. Rubanov

THE HISTORY AND FUTURE POTENTIAL OF THE DEPARTMENT OF HUMANITIES OF TOMSK POLYTECHNIC UNIVERSITY

The paper deals with the history of teaching humanities in Tomsk Polytechnic University. Today, the academic traditions laid by Tomsk Technological Institute are acquiring a new qualitative status. The major objective of the Department of Humanities is training of specialists competitive on the world market.