

Summaries

UDC 514.76

E.D. Glazirina
CAUCHY-RIEMANN CLASSIFICATION OF TWO-DIMENSIONAL VARIETY OF DIRECT LINES IN FOUR-DIMENSIONAL EUCLIDEAN SPACE

Two-dimensional variety $U_{1,2}$ of direct lines l_i^4 in four-dimensional Euclidean space was considered in the given paper. This variety is invariably connected with two-dimensional varieties $V_{1,2}^1$ and $V_{2,2}^2$ of L_1 and L_2 surfaces. Due to this fact, there is an occurrence of reflections between corresponding surfaces L_1^1 and $L_2^2 \perp L_1^1$ (in every element $l_i^4 \in U_{1,2}$). Every reflection is determined by the system of two inhomogeneous quadratic functions with two unknown variables or by the corresponding complex function. The paper reveals cases when the given functions are considered differentiable or harmonic in some or in all points of the corresponding planes L_1^1 or L_2^2 .

UDC 530.12:531.51

V.V. Lasukov
COSMOLOGICAL GLOW FREQUENCY SHIFTING

The paper describes photon red shift effect based on the investigation of geodesic line equation in homogeneous and isotropic Universe with Logunov's metrics. It is shown that the interpretation of Logunov's red shift is obvious in case with vacuum cosmological environment.

UDC 539.3

V.N. Barashkov
MODELLING OF THE INTERACTION BETWEEN THE OPERATING MECHANISM AND THE LAUNCHER

The paper reveals static elastoplastic task for two cylindrical bodies, inhomogeneous according to physical and mechanical characteristics, contacting with tightness. An algorithm, which implements the determination of the contacting surface position by iteration matching of similar in static baycenter of contacting bodies' radial stresses, is presented in the given paper to calculate contact pressure. Numerical calculation was carried out using variation and differential method with the correlation of deformation plasticity theory and Cauchy equations. Parameters of strain and deformation state of both bodies, as well as reaction distribution of the operating mechanism according to its width for various materials were obtained. The results of numerical analysis are presented in diagrams.

UDC 621.371:551.510.535;533.9:530.182;533.951.7

V.G. Spitsin
RADIO WAVES SPUTTERING IN THE EXPANDING TURBULENT FLOW OF WEAKLY IONIZED PLASMA PRODUCED BY SPACECRAFT JET ENGINES

The paper presents analysis and numerical calculation results of angular and frequency radio signal spectrum sputtered on the external surface of turbulent plasma formation and created by spacecraft jet engines.

UDC 531.951

E.T. Protasevich, V.I. Shishkovsky
LABORATORY MODELLING OF RADIO WAVES SCATTERING BY METEOR TRIALS

Laboratory radio wave modelling by meteor trials was considered in the given paper. It was shown that the experimental results of radio

wave resonance forward scattering by plasma cylinder coincide with theoretical analysis.

UDC 553.06

I.V. Kucherenko
THEORY AND PRACTICE OF FORMATIONAL METHOD IN ORE GEOLOGY. Part 2

The paper deals with formational classifications of tin, tungsten, molybdenum, gold, stibium, hydragirum, arsenicum, and fluorite deposits created in the framework of generally accepted multicomponent trend that reveals the thesis concerning multivariant state as a consequence of incorrect use of ore formations diagnostic properties. A number of disagreements concerning material, genetic, geological composition of ore formations are presented in the report. It is proved that one opinion (1983) dealing with the advisability to reconsider some key statements of ore formation method preserves its importance.

UDC 553.41:553.493.5 (571.15)

A.A. Potzeluyev, V.I. Kotegov, L.P. Rikhvanov, D.I. Babkin, A.Yu. Nikiforov
PRECIOUS METALS IN KALGUTINSK RARE METAL DEPOSIT (MOUNTAIN ALTAI)

High concentrations of precious metals (Au – up to 116 mg/t, Ag – up to 8,4 mg/t, Pt – up to 802 mg/t, Pd – up to 115 mg/t, Os – up to 7 mg/t) were established for geological formations of Kalgutinsk rare metal greisen deposit. Maximum contents of these elements are typical for small bodies of albitized granite-porphyry ($\gamma\pi\pi\text{J,vk}$), intra ore hydrothermally altered dikes of kulgutites ($\gamma\pi\pi\text{J,vk}$), ore veins, near ore greisens and independent ore-bearing greisen bodies of "Mo-stock" type. Gold is found in native form, and its high concentrations are noted in graphite grains (up to 100 g/t) and pyrite (up to 54 mg/t). Silver is impurity element of sulfides and sulfosalts and the main admixture in gold. High concentrations of the PGE are typical for pyrite, wolframite, and molibdenite. It is suggested that native mineral forms of platinoids are presented. Precious metals are characterized by nest distribution. Vertical and lateral zoning connected with the distribution of main ore elements, graphite and changes in the thickness of the vein have been observed. Perspectives for precious metal extractions were pointed out. The conclusion concerning abyssal mantle-plum character of the fluid-magmatic system of Kalgutinsk deposit was made.

UDC 552.5:550.4:553.982(571.51)

N.F. Stolbova, Yu.V. Kiselev, O.V. Betkher, Yu.M. Stolbov
LITHOGEOCHEMICAL PECULIARITIES OF THE EAST SIDE SECTION OF BOLSHEKHETSKAYA CAVITY (BASED ON THE RESULTS OF TUKOLANDO-VADINSKAYA PARAMETRIC WELL-320)

The paper deals with fluid migration processes, which appeared in rock epigenetic transformations and formation of lithogeochemical abnormalities. Oil-bearing rocks of domanik type were determined in the deposits of Sigovskaya, Yanovstanskaya, Malokhetskaya, and Sukhodudinskaya suites. Complex analysis of lithogeochemical abnormalities allowed to single out potential oil- and gas-bearing intervals of the reservoir rocks. The conclusion concerning the possibility of using lithological and petrographic, bitumen and lithogeochemical investigations of core and slurry to correct testing intervals in wells was made.

UDC 552.578.2:553.982(571.16)

**N.M. Nedolivko, A.V. Yezhova,
T.G. Perevertajlo, E.D. Polumogina**
**THE INFLUENCE OF GRANULOMETRIC AND MINERALOGICAL
COMPOSITION ON THE RESERVOIR PROPERTIES FORMATION
OF THE SANDSTONE LAYER J₃ IN WESTERN MOISEYEVSKY
SECTION, DVURECHENSKY FIELD (TOMSK OBLAST)**

Based on the quantitative petrographic surveys of the sandstone layer J₃ during the well development of 31R in Western Moiseyevsky Section, Dvurechensky Field, it was found that the granular-type reservoir was formed from medium sorted (S₀=2,1...3,5), coarse, medium-grained greywacke-arkosic sandstone (diameter from 0,26 to 0,68 mm) with more quartz (62 %) than feldspar (12 %) and clastic rocks (25 %). Porosity and permeability increase with increasing the maximum and median sizes of clastics, content rise of coarse-grained arenite fractures, quartz, weakly-changed feldspar, acid (per-silicic) rocks. Negative factors affecting the formation of reservoir properties are cement content increase, significantly changed feldspar, mica and amount of secondary linear contacts. The high positive correlation between reservoir properties and the size and volume of residual pores is found.

UDC 624.131

T.Ja. Emelyanova, V.V. Kramarenko
**SUBSTANTIATION OF THE INVESTIGATION THEORY CON-
CERNING PEAT DEFORMATION PROPERTIES TAKING INTO
ACCOUNT THE CHANGE OF ITS DECOMPOSITION LEVEL**

The paper reveals comparative results of peat decomposition in natural and storage conditions. The impact of microbial flora on various kinds of peat decomposition velocity was studied. The choice of compression and filtration experiments depending on the change of peat decomposition level during its storage is substantiated.

UDC 631.41: 631.416.4

V.P. Seredina, N.F. Protopopov
**IMPACT OF SULFUR ACID SPILL
ON SOIL ECOLOGICAL FUNCTIONS**

Experimental results of sulfuric acid spill on the reduction-oxidation and cation exchange properties of soil are presented in the given paper. Acid impact on humus statement of soil was studied during and after the sulfuric acid spill. Influence of technogenic contamination by sulfate ions on biomass of vegetation was shown.

UDC 536.24

P.P. Permyakov
**MATHEMATICAL MODELLING
OF TECHNOGENIC POLLUTION IN FROZEN SOILS**

Based on the methods of solving incorrect problems the thermo-physical and mass exchange characteristics of freezing and thawing dispersed soils are determined. The algorithms were developed to solve direct problems of heat and mass transfer.

UDC 535:371.623

O.V. Zhdaneev
**LASERS ON THE VAPORS OF COPPER
WITH MODIFIED KINETICS**

The generalization of results of the investigation of lasers on the vapor with modified kinetics, which works in impulse-periodic regime with various introduced additives and with the altered geometry of the working channel was done with the aim to identify the influences on excitation scheme of parameters' generation characteristics, pre-impulse values of copper electrons and atoms concentration in non-balanced state and also the percentage of active impurities in the gas discharge tube. The description of detailed non-stationary kinetic models of laser, which depict the time changes of values of occupancy of copper atomic levels, molecular and atomic impurities, density of copper ions and of impurities, electron temperature and intensity of laser irradiation on the green and yellow lines of copper atom and the results obtained on their basis are included into this work.

UDC 534.5: 681.787: 621.791

Ju.N. Dementiev, S.M. Slobodjan
**ACOUSTIC TECHNIQUES ANALYSIS FOR TESTING THE LOAD-
BEARING ELEMENT STRENGTH OF THE DISPLACEMENT DRIVE**

The validity of prompt testing of acoustic techniques of load-bearing element condition of displacement drive actuators has been considered. It has been demonstrated that the acoustic tomography techniques for strength assessment at the stage of the unit "catastrophe" are not applicable at the initial stage of developing the strength loss progress.

UDC 669.713/3

V.E. Ovcharenko, S.G. Psahye, O.V. Lapshin
**ACTIVE PROTECTION OF ELECTROLYZER BRICK-LINING
FROM ALUMINIUM MELT**

The possibility of increasing the efficiency of the protecting coating consisting of specifically refractory chemical compounds on the graphitized carbon hearth of the aluminium electrolyzer has been considered. With the aim to prevent penetration of aluminium melt through defects and destruction places of the protecting coating, it was suggested to use an additional nickel-aluminium alloy layer as a substrate of this coating. Quantitative estimations of the work resource of such two-layer coating consisting of the nickel-aluminium base and the upper layer from the specifically refractory chemical compounds were conducted for the operation of the aluminium electrolyzer under the real temperature regime. It was shown that the two-layer coatings are capable of self-restoring during interaction with aluminium melt and allow to vastly increase the resource of the electrolyzer operation.

UDC 621.039.74

V.A. Azarov, M.E. Silaev
**DETERMINATION OF PARAMETERS OF CONTAINER'S
BIOLOGICAL PROTECTION FOR LONG-TERM STORAGING
OF AMPULLACIOUS NEUTRON SOURCES**

The peculiarities of isotropic neutron source as a complex irradiator are considered. The major requirements to container for long-term storage of neutron sources are estimated. On the basis of normative requirements the experiment-calculated analysis of biological protection for dual purpose container is carried out. The optimization of biological protection dimensions is done. The degree of activation of concrete during the long-term (up to 50 years) storage of ampullacious neutron sources in the container is established. Suggestions concerning container engineering are proposed.

UDC 621.384

**V.A. Vlasov, A.I. Pushkarev, G.E. Remnev,
S.A. Sosnovskiy, V.V. Ezhov, T.I. Guzeeva**
**EXPERIMENTAL INVESTIGATION AND MATHEMATICAL
SIMULATION OF FLUORIDE COMPOSITIONS REDUCTION BY
PULSED ELECTRON BEAM**

The results of experimental investigations of tungsten hexafluoride decomposition in the mixture with nitrogen and sulphur hexafluoride decomposition in the mixture with hydrogen under the action of pulsed electron beam are presented. The data on gas mixture composition changes in the reactor measured by mass-spectrometer, energy consumptions of electron beam for the fluoride composition dissociation are given. The mathematical simulation of low-temperature plasma (N₂ and WF₆), (H₂ and SF₆) of gas medium at the electron beam injection is carried out. It is shown that in the non-equilibrium plasma of pulsed electron beam the chain process of sulphur and tungsten fluoride decomposition takes place.

UDC 546.832

L.P. Borilo, L.N. Mishenina, E.G. Mironova
**THIN FILMS OF HfO₂-Y₂O₃ SYSTEM PRODUCED FROM
HYDROLIZING SOLUTIONS**

Thin films of HfO₂-Y₂O₃ system were produced with the concentration of Y₂O₃ from 0 to 60 % film-forming solutions. In this work the properties of these solutions and the thermo-oxidizing were studied.

UDC 541.138.3

N.A. Kolpakova, A.A. Sechina
THE ASSESSMENT OF THERMODYNAMIC PARAMETERS
OF SORPTION OF CHLORIDE COMPLEXES OF IRIIDIUM (IV)
ON MERCURY-GRAPHITE ELECTRODE

Theoretical curve of complex $[\text{IrCl}_6^{3-}]$ oxidation was obtained by means of simulation along approximate formulas and experimentally obtained voltamperogram and the assessment of thermodynamical parameters of sorption for $[\text{IrCl}_6^{2-}]$ complex obtained as the result of electro-oxidation of $[\text{IrCl}_6^{3-}]$ complex on mercury-graphite electrode was carried out.

UDC 556.114.5:543.41

A.G. Zarubin, R.F. Zarubina, I.V. Smetanina
THE CHARACTERISTICS OF FLAME PHOTOMETRIC
DETERMINATION OF STRONTIUM, LITHIUM
AND POTASSIUM IN SALTISH WATERS

Methods of flame photometric determination of strontium, lithium, and potassium in saltish waters, based on determination of absolute photocurrent of emission of strontium, lithium, and potassium were described with the consideration of the influence of sodium while using methods of chemometrics.

UDC 665.64.442

A.V. Kostenko, A.V. Kravtsov, E.D. Ivanchina, A.L. Abramim
IMPLEMENTATION OF NON-STATIONARY KINETIC MODEL
FOR ASSESSMENT AND FORECASTING OF PLATINUM
CATALIZERS STABILITY AND ACTIVITY IN INDUSTRIAL
PROCESS OF GASOLINE REFORMING

Proposed approach to the development of kinetic models of reforming processes represents the sequence of stages of formation of the adequate scheme of mechanism of chemical-technological process with its further kinetic description, on the basis of which non-stationary generalized model of catalytic reactors and of the whole chemical technological system is formed. This model allows not only to efficiently assess the optimal regimes of processes for this raw material but also to forecast the catalyst activity during the intergeneration period and during its entire life time and to solve the problem of complex processing of crude oil at oil-processing plants and of modernization of active commercial plants.

UDC 536.46

G.V. Kuznetsov, G.V. Taratushkina
MECHANISM OF LOCAL EROSION OF ELEMENTS OF FLUE
GAS PATH OF BOILERS BY PARTICLES OF VOLATILE ASHES

The results of theoretical investigation of heat transmission process during the fall-out of particles of volatile ashes on the surface of elements of flue gas path of the boiler and the results of the numerical analysis of the level of thermal stress, taking place in thin sub-surface layer of the metal in the small neighbourhood of the particle are presented. The task was solved by means of finite difference. It was established that the values of elastic stresses, taking place in thin layer of metal close to the surface are sufficiently high. The implementation of the mechanism of local erosion of metals in flue gas path of boilers is possible due to the cracking of the surface with the formation of the grid of small cracks both in radial and hoopential directions, even during the inertial fall-out of particles of ashes with low velocities.

UDC 66.041.001.5:661.487

V.G. Bukreev, A.V. Tskhe
STATIC HEAT MODEL OF DRUM FURNACE

The possibility of calculating the temperature of raw material in drum furnaces was shown on the basis of mathematical model of technological process. The comparative analysis of experimental and theoretical data was carried out.

UDC 622.7-52 (075.8)

R.Zh. Bapova
AUTOMATIC CONTROL OVER THE CASCADE-WATERFALL
REGIMES OF DECOMPOSITION IN DRUM FURNACES

The critical analysis of the systems of automatic control, which stabilize the level of inter-mill loading of decomposed material is

shown. Taking into consideration major technological disturbance, that influence the working regimes of two-chamber mill with joined separation the need to carry out control over the decomposition regime with the use of regulated drive with new control parameters was discovered.

UDC 621.311

S.V. Goldaev
NUMERICAL REALIZATION OF METHOD USED FOR NON-
STATIONARY ANALYSIS OF TECHNICAL SYSTEM RELIABILITY

The variant of implementation of the method of intensive transitions (Markovian processes) used for non-stationary analysis of technical systems reliability was described. It is based on the numerical solution of simple differential equations. Examples of reliability analysis of heat and power equipment were considered.

UDC 621.384.6:539.12.04

V.A. Kolchanova
METHOD OF DETERMINATION OF PARAMETERS OF TESLA
TRANSFORMER

The possibility of experimental determination of parameters of substitution scheme of Tesla transformer from oscillograms of experiments of idling and reverse idling was shown.

UDC 621.37

V.M. Rulevski, Yu.N. Dementiev, O.V. Bubnov
POWER SUPPLY SYSTEMS
OF REMOTE CONTROL UNDERWATER VEHICLES

In the paper a review of modern power-supply systems of remote controlled underwater vehicle (RCUV) was done, several requirements of their choice were determined. A block scheme was proposed and implemented based on the analysis of existent RCUV. The power-supply system has good mass-dimensioning specifications and provides underwater vehicle of capacity up to 30 kW with continuous power supply.

UDC 621.313

A.I. Chuchalin, I.A. Safyannikov, I.N. Rossamakhin
MULTIPOLAR GENERATOR
FOR LOWER-POWER WINDMILLS

In this paper a new design of disk type multipolar electric generator with electromagnetic excitation is introduced. Applying the generator mentioned makes it possible to enhance the performance effectiveness of wind-driven power plants. The diagrammatic representation of an active zone presented serves as an example of generator design and operation principle. The basic distinguishing features of design and its position in the electrical machines classification are pointed out.

UDC 378.016

V.V. Kruchinin, Yu.V. Morozova
MODELS AND ALGORITHMS TO GENERATE TEST ITEMS
(TASKS AND QUESTIONS) IN COMPUTER KNOWLEDGE
TESTING SYSTEM

The article covers models and algorithms to generate test items (tasks and questions). The sample task template is described along with the generalized algorithm, built based on the template. Task templates generation and usage technology is presented. Samples of generating units, provided with their programming realization are given applied to particular subjects. Some of the template generators algorithms are considered in detail. The mentioned models and algorithms of generating programs have been already implemented into the educational process in Tomsk Interuniversity Center of Distance Education, TICDE.

UDC 612.821.11.35

O.G. Berestneva, K.A. Sharopin
CREATING MODELS OF STUDENTS ADAPTATION
TO STUDIES AT A HIGHER EDUCATIONAL INSTITUTION

The paper demonstrates efficiency of applying integral criteria of informational type for solving such tasks as assessment of students' health. The necessity of modeling adaptation strategy types as well as

usage of prognostic models of adaptation behaviour for diagnosing adaptation breakdown of the first-year students is shown.

UDC 577.3

V.A. Fokin

ESTIMATION CRITERION OF COMPLEX BIOSYSTEMS STATE

The estimation criterion for biosystems described with many-dimensional data is offered. The Mahalanobis distance function is used in the criterion which allows to effectively consider correlations, intra-, and inter-individual variations of data.

UDC 612.014.461

A.L. Testov

IDENTIFICATION OF PARAMETRES OF THE MONITORING MODEL OF WATER BALANCE OF AN ORGANISM IN REAL TIME

The paper views identification of parameters of the mathematical model of water balance monitoring of an organism in real time. It is shown that with the use of this model the methodical error of body water volumes' measurements doesn't exceed 5..6 %. It allows to obtain more accurate results if compared to similar methods.

UDC 338

O.V. Popov, N.N. Tsukublina

INFLUENCE OF ADMINISTRATIVE AND TAX REFORMS ON LOCAL GOVERNMENT DEVELOPMENT

The process of local government development creates the object of investigation. The basic positions of state administrative and tax reforms and their influence on local government are viewed in the article.

UDC 338

N.N. Tsukublina

INFLUENCE OF STATE SECTOR ON CONTROL OVER TERRITORY DEVELOPMENT

The process of territory development constitutes the object of investigation. The paper views the influence of the state on control over territory development as well as establishment of correlations between budgets of different levels. To control territory development it is necessary: to state the owner of the control process, to formulate the goals and orientate economic agents to achieve these goals. The unified procedure of tasks setting and problems solving starts the innovation process in the control system and binds the solution of the development tasks with the one of the problems of government's functioning.

UDC 620.9:658.5

E.L. Erofeev, Yu.P. Ehlakov, A.G. Chernov

COMPARATIVE ANALYSIS OF INFLUENCE EVALUATION METHODS OF ENERGY TARIFFS ON ECONOMIC SITUATION

The basic evaluation methods of energy tariffs influence on economy are described; their joint analysis is performed. The requirements to the "ideal" evaluation method of energy tariffs influence on economy are suggested involving cooperation among the governmental body with the subjects of energy market. The proposals are made concerning creation of the evaluation method of energy tariffs influence on economy of Tomsk region for the needs of Regional Energy Commission.

UDC 1(075)

O.A. Nikiforov

ON THE STATE OF HISTORIOGRAPHIC BASE OF THE PROBLEM OF REGIONAL DEVELOPMENT OF SMALL BUSINESS AT THE PRESENT STAGE

At the stage of Russia's transition to market economy the only way to understand contemporary problems connected with the development of Russian small business is to study new issues in social-political and social-economic relations. The problem becomes more topical due to the fact that development of new forms of small business in Russia occurred only as a result of radical changes in the early 1990-s; it doesn't have fun-

damental historical roots. The phenomenon of small business appearing in contemporary Russian history after almost 100-year pause and now developing on a large scale is considered as something absolutely new.

UDC 316.258

A.Yu. Rykun

POSSIBLE MEANS OF DEVELOPING SYSTEMATIC APPROACH TO LATE MODERN SOCIAL THEORY

The article is dedicated to modern trends in Social Theory, namely A. Giddens "structuration theory" and gender oriented theory by D. Smith. The author formulates conditions for the integration of Social Theory in late Modernity.

UDC 111.1:159.953

E.A. Tsibulevskaya

TRANSITIVE PERIOD IN THE DISCUSSION OF THE CONCEPT "RISK SOCIETY" AND PROBLEMS OF AUTHORITIES IN RUSSIA

The article analyses the transitive period of Russian public life in discussion of conceptual formations of the riskogenius society. The specific nature of authoritative relations in transitive period is considered.

UDC 13

T.A. Chukhno

"OBVIOUSNESS OF NON-OBVIOUS" AS AN OBJECT OF PHILOSOPHICAL DEBATE IN RUSSIAN RELIGIOUS PHILOSOPHY

The article is devoted to religious bases of Russian philosophical concept. The sources and the immanent essence of Russian philosophy as religious cognition thinking are defined. The main principles of Russian religious philosophy, its method and functions are considered. The advantages and particular features of religious philosophical cognition are analyzed. The special attention is paid to the problem of Absolute being in Russian philosophy.

UDC 167.5

N.V. Kovtun

ODOEVSKY'S NOVEL "THE YEAR OF 4338" AND THE TRADITIONS OF RUSSIAN INTELLECTUAL UTOPIA

The article is devoted to the development of the Russian literary utopia. Two trends of secondary genre – folk-mysterious and intellectual – are analyzed. V.F. Odoevsky's novel "The year of 4338" continues the traditions of Russian intellectual utopism, marked by mason symbols. The novel is a kind of an encyclopedia of Russian fiction utopia. Here all previous attempts, authors' techniques and approaches are seen.

UDC 550.3(571)(09)

L.Ya. Erofeev

CONTRIBUTION OF TOMSK POLYTECHNIC UNIVERSITY INTO ESTABLISHMENT AND DEVELOPMENT OF SIBERIAN AND FAR-EASTERN GEOPHYSICAL SERVICE

The article presents the history of establishing geophysical organizations in Siberia and in the Far East. The role of TPU's alumni in preparing specialists in geophysics as well as their participation in discovering new mineral deposits is shown.

UDC 551.49(571.16)(09)

N.M. Rasskazov

CONTRIBUTION OF TPU HYDROGEOLOGISTS INTO TOMSK AND TOMSK REGION

The paper deals with the history of the Department of Hydrogeology and Engineering Geology at Tomsk Polytechnic University. The department members research activity on hydrogeology of Tomsk region, creation of Tomsk water supply point, microbiological studies, providence of the city with engineering specialists, burial terms of liquid radioactive wastes of Siberian Chemical Plant, and hydro geochemical methods of mineral deposits discovering is considered.