
Summaries

UDC 512.541

P.A. Krylov, E.I. Podberezina
ABELIAN GROUPS AS ARTINIAN OR NOETHERIAN
MODULES ABOVE ENDOMORPHISM RINGS. PART 1

The paper considers the results of Abelian groups' investigation as Artinian or Noetherian modules above endomorphism rings. Abelian groups A and B are described showing that homomorphism group $\text{Hom}(A, B)$ is an Artinian module above the endomorphism ring of B group. The description of A and B groups for which group $\text{Hom}(A, B)$ is an Artinian module above the endomorphism ring or A group concerns the case when group A does not experience any twisting, and group B is regarded either a quasi-cyclic group or a divisible group without twisting. Abelian groups A and B for which group $\text{Hom}(A, B)$ is a Noetherian module above the ring $E(A)$ or $E(B)$ are characterized. The investigation of an optional Abelian group with the left Noetherian endomorphism ring deals with the investigation of groups without twisting with left Noetherian endomorphism ring. The investigation of right Noetherian ring remained incomplete. Separable Abelian groups without twisting with left or right Noetherian endomorphism rings are described.

UDC 519.21

M.A. Banko
NECESSARY AND SUFFICIENT CONDITIONS
OF A L_2 -STABILITY OF LINEAR DIFFERENTIAL
EQUATION WITH SEMIMARKOV FACTORS SOLUTION

The paper deals with obtained sufficient conditions of L_2 -stability of linear differential equation with coefficient depending on semi-markov process that is capable of accepting two conditions with the fixed transition intensity from one state to another.

UDC 519.886

V.P. Grigoriev, A.V. Kozlovskikh, D.A. Maryasov
QUALITATIVE RESEARCH OF THE SYSTEM OF DIFFERENTIAL
EQUATIONS OF THE DYNAMIC CHAOS MODEL
AND CORRELATION OF SINGULAR POINTS WITH TRENDS

Qualitative research of mathematical model of futures market dynamics is carried out. The possibility of forecasting the factors of trend change on the basis of singular points and trends trajectory correlation is shown.

UDC 681.3

Yu.B. Burkatovskaya, M.A. Karagodin, A.N. Osokin
BIVARIATE DISCRETE TRANSFORMATIONS IN SHRINKING
ALGORITHMS OF VIDEO SEQUENCE

The paper considers bivariate discrete orthogonal transformations which allow significantly reduce the shrinking time of video sequence shot and can be implemented as hardware codec.

UDC 534.1:621.397

S.M. Slobodyan
FERHULST DYNAMICS – A STABILITY PARADIGM
OF TELEVISION FOLLOWER ARRANGEMENTS

The analysis of tracking loss scenario in automatic television systems is made. Analogue behavior of Ferhulst follower system is defined. Computerised modeling and full-scale experiment prove the results of the analysis.

UDC 539.32:548.053

V.L. Ulyanov, A.A. Botaki, E.V. Pozdeeva
ELASTIC AND ACOUSTIC PROPERTIES
OF CERAMIC NONCONDUCTORS

The paper shows experimental results of elastic properties and velocities of the acoustic waves in ceramic non conductors, crystal phases of which consist of monocrystals mainly with electrovalent connection.

UDC 538.945

A.V. Minkin, S.L. Tsarevsky
LOCAL MAGNETIC FIELD IN IRREGULAR VORTEX LATTICE
OF II CLASS SUPERCONDUCTORS

Magnetic field $\mathbf{h}(\rho, z)$ distribution and distribution function $f(h, z, \sigma)$ for regular and irregular Abrikosov vortex lattice at different depths z from superconductor surface was defined using London's modified equation for II class superconductors with $\kappa \gg 1$ (κ – Ginsburg-Landau parameter). It is shown that the local magnetic field significantly changes depending on "nonregularity level" of superconductor vortex lattice.

UDC 621.314

E.E. Slyadnikov
THERMODYNAMIC THEORY
OF MARTENSITE STRUCTURAL TRANSFORMATION

Thermodynamics of martensite structural transformation caused by both temperature change and the external mechanical force is theoretically studied. Physical reasons and conditions of subtransient state formation are defined. Dependencies of rank and temperature parameters are obtained.

UDC 553.411.071.242.4+550.4

I.V. Kucherenko
GEOCHEMICAL FEATURES OF NEAR-VEIN METASOMATISM
IN QUARTZ DIORITES AND GRANODIORITES OF LOCAL
DOMES CONSTRUCTION IN KEDROVSKY GOLD DEPOSIT
(TRANSBAIKALIA). Part 1. Modes of occurrence
and identification of igneous rocks

The paper considers new geological and analytical materials reflecting spatial-temporal and causal connection of metasomatic and geochemical halos using the example of intervein space of poor gold bearing quartz veins of Kedrovsky field comprised of Late Paleozoic igneous rocks of ultrametamorphic local dome construction. The first part of the article deals with modes of occurrence and formation of igneous rocks, shows their identity, and describes the geological basis for further discussion of structure, relations and correlation of near-vein metasomatic and geochemical halos in the second part of the article. New data prove the earlier established direct dependency of metal-bearing capacity of near-vein geochemical halos on the level of ores metal-bearing capacity.

UDC 553.411:550.83.02

Yu.V. Kolmakov, A.M. Sazonov, A.Yu. Pinson,
E.V. Potekhina, I.F. Gertner, P.A. Tishin
PETROMAGNETIC AND MINERALOGICAL INHOMOGENEITY
AND GOLD CONTENT OF BLAGODATNY DEPOSIT ORE ZONE

Data on magnetic formations morphology of Blagodatny deposit ore zone of Eniseisky ridge are cited. The assessment of their gold content is made. Magnetic properties of rocks and ores consisting of various sulphide assemblage are characterized. The reasons of the increased ore gold content containing arsenopyrite and pyrrhotite assemblage are given.

UDC 621.3.048

V.Ya. Ushakov
VACUUM AND GAS PULSE DISCHARGE. THE ACHIEVEMENTS
OF TPU HIGH VOLTAGE SPECIALISTS FOR THE LAST 60 YEARS

The paper summarizes basic investigation results of technical vacuum pulsed breakdown in large intervals, as well as vacuum and pressurized gas electric strength at the discharge in their volume and on the surface of solid dielectrics. Basic parameters of high voltage elements developed in TPU (TPU) on the basis of the obtained results are shown: electron gun of high-current accelerator at 3 MeV, electric-discharge CO₂ laser, peaking gas-filled discharger at 3 MV voltage.

UDC 537.525

V.Ya. Ushakov
PULSE ELECTRIC BREAKDOWN OF CONDENSED MEDIA.
THE ACHIEVEMENTS OF TPU HIGH VOLTAGE SPECIALISTS
FOR THE LAST 60 YEARS

The paper concerns great contribution of Tomsk high voltage specialists made to the investigation of pulsed electron breakdown of liquid and solid dielectrics, to the establishment of scientific background for high voltage nanosecond devices insulation design, to the development of electric discharge technologies (electric pulsed drilling, crushing and disintegration, surface purification, etc.).

UDC 621.374;621.3.048

V.V. Lopatin, M.D. Noskov
DEVELOPMENT OF DISRUPTIVE INCONSISTENCY
IN CONDENSED DIELECTRICS

The paper analyses the existing understanding of initiation and development of discharge channels in liquid and solid dielectrics within the notion of inconsistency development in the open systems. It gives an approach to qualitative description of discharge channels development on the basis of electrodynamics rules and stochastic equation connecting the probability of phase transition dielectric-plasma with accumulated energy. Physical-mathematical model allowing stimulation of discharge channels using self-consistent equation solution is described. Defining possibilities of the developing discharge parameters and characteristics using the example of modeling results are shown.

UDC 537.529+534.222.2

V.V. Burkin, N.S. Kuznetsova, V.V. Lopatin
ELECTRICAL EXPLOSION MODELING IN SOLID DIELECTRICS
OF ELECTRICAL DISCHARGE TECHNOLOGIES

Wave dynamics of dielectric's stress-strain state at the adaptation of plasma discharge channel to the solid body close to its surface, which is a typical electrical discharge technology, are analyzed. Various mechanisms of slabbing cone formation are considered within the framework of mathematical model consistently describing discharge resistor circuit operations, discharge channel expansion, and elastic-plastic waves' generation. This is a both less energy-consuming process, which is implemented together with the reflected from the surface waves, and more energy-consuming, where the direct wave of compression stress performs the function of cracks formation, and more efficient conditions of the treated material of destruction are defined.

UDC 624.15

V.I. Kurets, A.Yu. Yushkov
PRODUCTION OF FILLING PILES AND ANCHORS USING
ELECTRIC PULSE DISCHARGE

The paper considers pulse estimation technique and influencing results of impulse load on the ground and concrete at electrohydraulic method of filling piles production. Estimation results satisfactory coincide with the data obtained during the experiment.

UDC 537.52

A.N. Grigoriev, A.V. Pavlenko, A.P. Ilyin, E.I. Karnaukhov
ELECTRIC DISCHARGE AT THE SURFACE OF A SOLID
DIELECTRIC. PART 2. INVESTIGATION
OF HIGH-CURRENT SWITCH BOARD

Influence of charge voltage and loading inductance on switch board characteristics operating at the principle of dielectric surface breakdown are experimentally investigated. Electrical impedance, active resistance and inductance at various operating regimes of a switch board are changed. It is shown that quasi-stationary discharge state takes place at time 5...18 ms provided the inductance and active resistance of a switch board are constant.

UDC 621.315

S.M. Kutsenko, N.N. Klimov, V.I. Muratov
CHARACTERISTICS OF PARTIAL DISCHARGES IN PORCELAIN
WARE AND POLYCARBONATE INSULATORS

Characteristics of electromagnetic field and acoustic noise which occur at the appearance of partial discharges in porcelain ware and polycarbonate insulators are investigated and analysed. The duration of partial discharge pulses amounts to 5...20 ns, spacing frequency equals 50...500 Hz for porcelain ware insulators and about 4 kHz for polycarbonate insulators. It is suggested combining the electromagnetic method of partial discharge registration using antenna with the existing acoustic diagnostics method to increase the diagnostic quality of porcelain ware insulators of the railroad.

UDC 621.384.647

G.E. Remnev, A.I. Pushkarev, E.G. Furman, V.V. Ezhov,
D.V. Goncharov, V.S. Lopatin, A.V. Stepanov,
V.A. Makeev, V.I. Guselnikov, Lee Tsen Fen
PULSED ELECTRON AND ION BEAM SOURCE ON THE BASIS
OF NANOSECOND VOLTAGE GENERATOR WITH MATCHING
TRANSFORMER

The paper presents the construction of nanosecond voltage generator using step-up transformer and plunger forced demagnetization before voltage pulse formation. Nanosecond electron beam source with the following parameters: kinetic electron energy is 450...500 keV, beam current is 6 kA, pulse duration at half-height is 60 ns is created on the basis of the developed generator. The generator is being used for the formation of pulsed ion beam with the following parameters: ion current density is ~600 A/cm², energy density is ~11 J/cm², anode potential is 300...350 kV. The construction of ion diode without preliminary plasma operating time is described.

UDC 533.95,538.4

D.Yu. Gerasimov, A.A. Sivkov, A.S. Saigash,
R.R. Sharipov, S.I. Privezentsev
INFLUENCE OF SOLENOID MAGNETIC FIELD OF COAX
MAGNETOPLASMA ACCELERATOR ON ELECTROEROSIVE
WEAR OF THE ACCELERATING CHANNEL SURFACE

The paper shows the possibility of controlling the value of the electroerosive wear of the accelerating channel surface of coax magnetoplasma accelerator and coating operating material lifetime. The control is carried out by means of changing the penetration of the external axial magnetic field inside the accelerating channel. At the same time the dynamic parameters of pulse plasma spray at the accelerator channel shear remain almost unchanged.

UDC 533.95,538.4

D.Yu. Gerasimov, A.A. Sivkov, A.S. Saigash,
R.R. Sharipov, S.I. Privezentsev
ELECTROEROSIVE WEAR OF THE ACCELERATING CHANNEL
SURFACE IN HYBRID COAX MAGNETOPLASMA ACCELERATOR

Basic principles of electroerosive wear of the accelerating channel surface in hybrid coax magnetoplasma accelerator regarding the accele-

ration dynamics and plasma velocity fluctuation are shown on the basis of the experimental research. It is supposed that velocity fluctuations are caused by the appearance of shock waves at plasma supersonic flow in the accelerating channel. The value of energy input at the accelerator is considered the most significant factor defining electroerosive wear. The distinctive feature is quadratic dependence of wear value on the input energy. The obtained results allow defining the optimal geometry of the accelerating channel and necessary energy for lifelength and removal of the required mass of the material from the channel.

UDC 544.54;544.55

**A.I. Pushkarev, G.E. Remnev, D.V. Ponomarev,
V.V. Ezhov, D.V. Goncharov**

USE OF PULSED ELECTRON BEAMS IN PLASMA CHEMISTRY

The paper presents an overview of experimental results on the conversion of gas-phase connections in pulsed electron beam plasma. The analysis of energy consumption for halogenide decomposition (SF₆, WF₆, SiCl₄ and TiCl₄), liquid-phase hydrocarbons, pyrolysis and partial oxidation of methane, nanodispersed metal and nitrogen oxides synthesis is made. It is shown that in contrast to other methods of plasma formation chain conversion of gas-phase connections takes place at the influence of pulsed electron beam. In this regard electron energy consumption for parent molecules decomposition is lower than their dissociation energy.

UDC 537.523/.527,621.35.035

**N.A. Yavorovsky, Ya.I. Kornev, S.V. Preis,
S.S. Peltsman, M.B. Khaskelberg, B.N. Chen**
**PULSED BARRIER DISCHARGE AS A METHOD
OF WATER PROCESSING: ACTIVE OXIDIZER PARTICLES
IN AIR-AND-WATER FLOW**

The paper concerns the experimental results of pulsed barrier discharge in air-and-water flow. Basic discharge products that contribute to water purification are defined. It is shown that the discharge is mainly developed close to water surface, which increases the efficiency of short-living particles formed in the discharge.

UDC 537.521.7:621.315.611

O.S. Gefle, S.M. Lebedev, S.N. Tkachenko
**APPLICATION OF DIELECTRIC SPECTROSCOPY METHOD
FOR THE ASSESSMENT OF POLYMERIC DIELECTRICS
CONDITION IN THE ELECTRIC FIELD**

Dielectric relaxation spectra of composite materials on the basis of synthetic rubbers and LDPE filled with ferroelectric ceramic powder PZT (lead zirconate titanate), the so-called 0-3 composites, and polymeric blends on the basis of LDPE are studied in this paper. Temperature-frequency dependencies of complex permittivity are studied using dielectric spectroscopy method. The fields of application of new polymeric composite materials and blends are estimated using this method.

UDC 537.521.7:621.315.6

**O.S. Gefle, V.A. Volokhin, S.M. Lebedev,
Yu.P. Pokholkov, E.I. Cherkashina**
**ASSESSMENT OF THE INITIAL STAGE OF PMMA
BREAKDOWN IN DIVERGENT ELECTRIC FIELD
BY MEANS OF THERMAL EFFECTS**

Phenomenological model of assessing the initial stage of polymethylmethacrylate (PMMA) breakdown in a divergent field by means of thermal effects is presented in this paper. Treeing characteristics of PMMA at 50 Hz AC voltage are estimated. Satisfactory agreement between the experimental results and the model predicted data are found.

UDC 621.315.6

S.M. Lebedev, V.A. Volokhin, B.V. Shmakov, P.A. Matin
**PRODUCTION TECHNOLOGY OF POLYCARBONATE HIGH
VOLTAGE INSULATION**

The paper shows main experimental results obtained at the usage of novel technology of HV insulation production on the basis of poly-

carbonate resins by means of long-term endurance in melt. The developed technology allows producing solid large HV insulators.

UDC 551.594.221

A.A. Dulson, V.P. Gorbatenko
**INVESTIGATION RESULTS OF THUNDERSTORM
ACTIVITY IN TOMSK OBLAST**

The paper presents basic results of thunderstorm activity special distribution in Tomsk Oblast. Thunderstorm characteristics registered with thunderstorm recorders are compared with the results of thunderstorm activity obtained on the basis of theoretical calculations. The development of indirect estimation methods of thunderstorm activity is urgent due to the lack of regular instrumental observations of thunderstorms in Russia.

UDC 621.284.3

**V.P. Vavilov, V.G. Torgunakov, D.A. Nesteruk,
S. Marinetti, P. Bison, E. Grintsatov**
**DEFINITION OF THERMAL PHYSICAL CHARACTERISTICS
OF MATERIALS USING IR-THERMOGRAPHY METHOD**

The paper considers the use of IR-thermography for express definition of thermal physical properties of materials. Traditional Parker's method is described using the example of cylindrical roaster coating, as well as a new method of defining thermal conductivity tensor component using the example of coal-plastic composite material.

UDC 621.039.55.001.4

Yu.V. Babushkin, V.P. Zimin
**METHODS OF ANALYSIS OF VOLTAGE-CURRENT CHARAC-
TERISTICS OF THERMIONIC-EMISSION ASSEMBLAGE**

The paper presents methods of analysis of temperature and potential fields, as well as voltage-current characteristics of thermionic-emission assemblage multiple-unit in vacuum, diffusive and discharge operating modes. The solution algorithm of self-consistent two-dimensional task of thermal and electrical conductivity with complex barrier conditions allowing to obtain the dependency of the output power on heat-liberation value, cesium steam pressure, load resistance, input temperature and coolant rate is shown.

UDC 537.333

V.P. Grigoriev, T.V. Koval, A.V. Kozlovskikh
**ELECTRON MOVEMENT IN THE REFLECTION TRIODE
TAKING INTO ACCOUNT THE MAGNETIC FIELD
OF CURRENT COLLECTOR SYSTEM**

The paper considers the influence of electron current magnetic field which flown down the anode on the electron movement in diode and reflection triode with virtual cathode. It is shown that the magnetic field of anode current influences the flight time of diode split and electron movement trajectory. The dependence of electron flow self-insulation on diode parameters is presented. It is also shown that anode current magnetic field in triode with virtual cathode leads to the displacement of electrons diminishing the modulation of electrons at the phase and increasing the dispersion of electrons at oscillation amplitudes, which in its turn leads to the decrease in radiation efficiency.

UDC 620.17

A.E. Kolgachev, S.V. Panin, Yu.I. Pochivalov, N.A. Antipina
**THE INFLUENCE OF PRELIMINARY NANOSTRUCTURING OF
SURFACE LAYER ON WEARING CAPACITY OF TITANIUM
ALLOY BT6, WHICH UNDERTOOK SURFACE IMPREGNATION**

The comparative study results aimed at stating the behavior of titanium alloy samples in the course of friction and wearing out with nanostructured surface level followed by surface impregnation are represented. It is shown that such integrated processing allows to increase the near-surface level microhardness from 3800 up to 4800...5600 MPa. Besides, wearing capacity can be greatly improved. The result obtained is based on the formation of surface strengthened layers the microhardness of which is high and the thickness ranges

from 50...150 micron. The boundary is represented as the strengthened layer – matrix and is different from a flat one.

UDC 539.121.8.04:621.9.047.7

**V.P. Sergeev, M.V. Fedorischeva, A.V. Voronov,
O.V. Sergeev, V.P. Yanovski, S.G. Psakhie**
**TRIBOLOGICAL-MECHANICAL PROPERTIES AND
NANOCOMPOSITE COATING STRUCTURE OF Ti_xAl_{1-x}N**

Tribological-mechanical properties and structural characteristics of Ti_xAl_{1-x}N coatings obtained in the course of magnetron sputtering under the conditions of ion bombardment and without it are studied. The nature of influence of ion treatment method on hardness, elastic modulus, wearing resistance of coatings is defined. Cutter plate wear properties produced from hard alloy metal T15K6 with coating are defined. Based on the analysis of phase and chemical compositions of coatings and on the definition of intrinsic elastic stress level, lattice level, average grain size and its preferential crystallographic orientation, the interrelation of coating properties and their structural and phase properties are discussed.

UDC 621.793.74:616-089.843:616.31

A.V. Lyasnikova, O.A. Dudareva
**ELECTROPLASMIC METHOD USED FOR FLUORINE
HYDROXYAPATITE BIOACTIVE COATINGS
APPLICATION OVER DENTAL IMPLANT**

The problem of dental implants rejection within different periods can be successfully solved if to apply a special bioactive coating to their surface with the help of electroplasmic sputtering method. The main bioactive components of such coatings are considered to be hydroxyapatite, tricalcium phosphate, bioglass, bioglass-ceramics. In the course of research it is found out that fluorine hydroxyapatite is the best material for biocoating due to the stimulating effect it provides for the bony tissue growth. Special method of bioactive sputtering based on fluorine hydroxyapatite and ultrasonic final polishing are described in this article.

UDC 66.023.2

I.A. Tikhomirov, D.G. Vidyayev, A.A. Grinyuk
**EVALUATION OF PLATES NUMBER AND SETUP TIME
OF BALANCED (STATIONARY) CONDITIONS
WITHIN AMALGAMATE EXCHANGEABLE CASCADE**

The estimation method of theoretical numbers of plates within amalgamate exchangeable cascade taking into consideration the amalgam decomposition is demonstrated. It is shown that in order to obtain complete amalgam decomposition, the cascade should consist of 200 theoretical plates and decomposition quantity should be equal to 0,8 %. Formula used to estimate the setup time for balanced condition within amalgamate exchangeable cascade where quantity of isotope transfer along the column is taken into consideration, is derived.

UDC 535.37

E.S. Bekhtereva, Yu.B. Yuhnik
**THE RESEARCH OF OSCILLATORY AND ROTARY
ABSORPTION SPECTRUM OF MOLECULE AsD₃
IN THE AREA RANGING FROM 1350...1700 cm⁻¹**

The analysis of recorded molecule spectrum AsD₃ with high resolution (0,0027 cm⁻¹) in the adsorption area of once exited valence oscillations is carried out. Within the fields studied, more than 3300 changes with maximum value of quantum number $J=28$ are identified. In the course of spectrum analysis the model of Hamiltonian is used. This model takes into consideration the interaction between conditions (1000) and (0010). 50 obtained spectroscopic parameters (there are 26 diagonal parameters and 24 resonant blocks) reproduce the experimental data with average accuracy 0,00024 cm⁻¹.

UDC 544.52

E.P. Surovoi, S.M. Sirik, L.N. Bugerko
PHOTOLYSIS OF AZIDE SILVER SYSTEMS – COPPER

Kinetic and spectral legitimacies of photolytes formation of system AgN₃(A.) – Cu depending on intensity of an incident light

($2,8 \cdot 10^{14} \dots 3,17 \cdot 10^{15}$ quantum cm⁻²·s⁻¹) at $\lambda=365$ nm and time of exposure are investigated by mass-spectrometric and spectrophotometric methods. Making system AgN₃(A.) – Cu, their pretreatment by light $\lambda=365$ nm alongside with magnification of velocity of photolysis and photocurrent in the field of natural uptake AgN₃ (A1) results in expansion of spectral sensitivity area of silver azide. The model of photolysis of system AgN₃(A.) – Cu, including generation, recombination and redistribution of the electrons - hole pare in a contact field, formation of microheterosystems silver azide - silver (photolyte) and formation of nitrogen is offered. It is shown that the diffusion of silver mobile ion to neutral centre limits the process of photolysis system AgN₃(A.) – Cu. Specific velocity, velocity and kinetic constant of photolysis are calculated.

UDC 665.64

E.N. Mikhailova, A.V. Kravtsov, E.D. Ivanchenko, D.I. Melnik
**SIMULATION OF DEHYDROGENATION PROCESS
OF N-PARAFFIN C_n-C_n IN ADIABATIC REACTOR
WITH FIXED BED OF Pt-CATALYST**

New kinetic model of n-paraffin C_n-C_n dehydrogenation process on the industrial platinum catalyst in the adiabatic reactor with fixed bed of catalyst is offered. This model takes into consideration the changes of raw materials composition and technological conditions of the process. Numerical values of kinetic parameters are defined. The influence of raw material composition on selectivity of target reaction is studied.

UDC 622.276.344:665.642

V.R. Antipenko, O.A. Golubina
**HEAVY OIL FRACTION TRANSITION IN THE CONDITIONS
OF THERMAL ENHANCED OIL RECOVERY**

Hydrothermal conversion product composition of resinous-asphaltic materials of hydrothermal conversion products of natural asphaltite with temperature ranging from room temperature up to 575 °C is studied in the framework of laboratory modeling of high molecular component transition of crude oil when using thermal methods of enhanced oil recovery. It is stated that within the range of 175...575 °C resinous-asphaltic materials undergo chemical transformations which lead to the formation of gases such as H₂S, liquid and insoluble products (oil and carbene-carboids correspondingly). The temperature influences not only the relative yield of the above mentioned products but also their element, group and functional content. In liquids of hydrothermal conversion the content of oil is higher in comparison with the original sample, the ration of benzol and alcohol-benzol resins changes significantly in favour of the latter ones as they are rich in oxygen structural segments. The content of asphaltenes decreases. Relative content of high molecular (>C₁₀) n-alkanes is higher in conversion products at 175...325 °C, and is lower at 350...575 °C than in the initial asphaltite. Olefins appear in the content of conversion products at 400 °C.

UDC 666.1.022.4:66.093.2

N.S. Krashennnikova
**INFLUENCE OF METHODS OF MIXTURE PREPARATION
ON THE PROCESS OF GLASS MELTING**

Both experimental-industrial results of granulation technology tests of glass mixture and research aimed at stating the influence of granulation on glass melting process applied to produce household plates and dishes are represented. Basic technological granulation parameters taking into consideration the conditions of specific production and positive influence of granulation on glass melting process are determined.

UDC 669.046.582.5

A.S. Zavorin
**VISCOSITY-TEMPERATURE DEPENDENCES FOR MELTING
SLAG OF DIFFERENT COMPOSITIONS**

Experimental dependences of melting slag viscosity from Kansk and Achinsk area on temperature are represented. Chemical composition is taken into consideration. The influence of crystal phase on the nature of viscosity is shown. Express-method of calculation aimed at melting viscosity determination taking into consideration its chemical composition is offered.

UDC 536.24:666.973.2:666.64.492.3:692.2

**A.N. Khutornoi, A.Ya. Kuzin, A.V. Kolesnikova,
N.A. Tsvetkov****TWO-DIMENSIONAL NON-STATIONARY
HEAT TRANSMISSION IN THE HETEROGENEOUS LECA**

Solid-cast framework is designed to build LECA with ordered arrangement in the thickness of vertical steam proof constructional forms with efficient warmth-keeping. Basing on physical-mathematical model parametrical analysis aimed at influence of different factors on LECA heating rate is carried out numerically. In the climatic chamber the value of which equals 58 m³ experimental research of thermal heat and heat-protective properties of the wall part with the size 2 2 m is carried out. Satisfactory correspondence of calculation results and experiment of thermal fields and heat flow density is obtained. Therefore, such method is recommended to be used for practical applications.

UDC 621.791.75.037

**D.A. Chinakhov, V.T. Fed'ko, O.G. Brunov, Yu.N. Saraev
COMPARATIVE ANALYSIS OF ARC WELDING METHODS
OF HARDENING STEELS IN TO THE SLOT BREAKING**

The problem of high-strength alloyed steels in to the slot breaking is considered. Comparative analyses results of samples studying made of steel 30XГСА are demonstrated. Different types of pulse arc welding are applied. It is stated that the type of welding when the pulse feeding of electrode wire is used, has some advantages and provides good formation quality of joint and high efficiency of junctions with slot breaking.

UDC 621.313

**S.I. Kachin, Yu.S. Borovikov, E.N. Klyzhko,
O.S. Kachin, V.Yu. Sablukov****MAIN TRENDS WITHIN THE FIELD OF MULTIPURPOSE COLLECTOR
ENGINES DEVELOPMENT OF ELECTRIC DRIVE BASED ON
OPTIMIZATION OF THEIR ELECTROMAGNETIC STRUCTURE**

The ways of provision of maximum energy characteristics, minimal consumption of winding wire, resource rates increase, and electromagnetic compatibility of collector electric engines with electron system are considered.

UDC 62-83:621.313.333

**L.K. Burulko, L.A. Payuk
MATHEMATICAL MODELING OF VARIABLE-FREQUENCY
ELECTRIC DRIVES**

Mathematical model of the following system: frequency converter – asynchronous motor, which allows studying dynamic operating mode at scalar frequency control and defining the influence of feeding voltage harmonious composition on electric drive operating speed, is shown.

UDC 621.0

**V.A. Dubovik, E.N. Pashkov
OUT-OF-BALANCE ROTOR MOVEMENT WITH LIQUID
AUTOBALANCE DEVICE AT INCREASING ANGULAR
VELOCITY BASED ON LINEAR LAW**

Rotor oscillation with automatic balancing device on flexible shaft when passing through critical velocity is studied. Differential equations, which describe mechanical system movement within horizontal plane, are solved with the help of Runge-Kutta numerical method. Calculation results are compared with well known, for rotor, out-of-balance device.

UDC 620.179.1

**A.V. Perelygin, V.K. Kuleshov
OPERATING CONTROL DEVICE OF DISTANT
END CURVE OF FIBER-OPTIC ENDOSCOPE**

The device, which allows controlling the curve of endoscope distant end with the help of hand holding, is developed. Equipment kinematic scheme, operation principles, and short-run fiber-optic endoscopes design "KOBRA" and "GRADAN" are demonstrated.

UDC 519.72

**V.O. Osipyann
INFORMATION PROTECTION SYSTEM BASED
ON KNAPSACK PROBLEM**

The possibility of generalization of basic knapsack information protection system is shown. Algorithm of injective non-standard knapsack with n+1 dimension, where the cascade value is given, based on similar knapsack with n dimension is demonstrated. A simple task of non-standard knapsack set is considered.

UDC 681.326

**L.A. Belitskaya
SINGLE ERROR CORRECTION IN MULTIPHASE CODE**

Systematic code for single error correction in multiphase codes is offered. It is possible to build multidimensional multidimensional array using digital-vectorial theory, and on their basis geometrical images of corrected signals can be built.

UDC 338

**A.A. Lukyanets
METHOD OF PROBLEM SITUATION ANALYSIS WITHIN THE
ENERGY MARKET AND PUBLIC UTILITIES OF THE REGION**

Possibility of application of the suggested method of problem situation analysis connected with regional social and economical systems management is shown. Together with other supportive methods aimed at decision-making it will make the process of performance, evaluation, strategic measures planning aimed at management and analysis of consequences of their implementation easier.

UDC 658.5:502.33

**A.I. Borodin
ECOLOGICAL-SOCIAL-ECONOMIC SYSTEM MODELING**

The model of ecological-social-economic system based on unanimity and inextricable connection of economic and ecological systems, analysis of pollution flow generated with the help of economic system and their influence on the environment is developed.

UDC 316.42:327

**O.A. Mazurina, A.P. Moiseeva
SOCIAL ASPECTS OF ORGANIZING INTERNATIONAL SCIENTIFIC
ACTIVITY IN THE CONDITIONS OF GLOBALIZATION**

The peculiarity of communicative field of social aspects in the conditions of globalisation, which provides an influence on the development of crosscultural, international and scientific activities is analysed.

UDC 017

**N.V. Kozlova, O.G. Berestneva
HIGHER TECHNICAL SCHOOL AND ENGINEERING
EDUCATION IN MODERN CONDITIONS
(PSYCHOLOGICAL AND ACMEOLOGICAL APPROACH)**

Personalised concept of education and new approach to educational problem of modern specialists training based on the theory and methodology of acmeology is considered. The main educational strategy based on the system of acmeology knowledge is introduced. New approach aimed at both students' personal recourses and difficulties in the field of professional development by means of computer system of education quality assessment.

UDC 330.010

**O.Yu. Korneva
HUMAN CAPITAL ASSETS AND ITS ROLE IN THE FIELD
OF INNOVATIVE ECONOMY**

In the course of market economy improvement the attention is paid to modernization, reconstruction, production development based on new technical principles, innovative activity implementation aimed at application of scientific and technical results of development in the

field of production, new technological processes development, and reconstruction of all the fields of material production and service sector on the basis of modern scientific and technical principles. It is essential to take into consideration that human capital assets, which has backbone quality and provides the efficient utilization of all production factors is considered to be a crucial factor in the field of economy development of the society.

UDC 330.342.146

T.B. Ostraya
WELFARE STATE AS A KEY TO ACHIEVE SOCIAL TRUTH

Contradictions between economic efficiency and social truth are shown. The essence of welfare state as a key factor used to adjust differences is analyzed. The necessity of state interference into the country economy is proved.

UDC 81'22:81'373.611

A.P. Moiseeva, N.A. Kolodi
ON THE PROBLEM OF EXPERIENCE

Existing philosophical and methodical approaches to the nature and essence of spiritual experience are analyzed. The evolvement of conceptions is revealed. Modern discourse conflicts are represented.

UDC 930(091);930(092)

V.D. Yushkovski
THE LITERATURE OF THOUGHT AND THE LITERATURE OF FEELING (ON THE ISSUE OF VIEWS FORMATION OF G.S. BATENKOV)

"Pathways to the book" and literature preferences of Decembrist G.S. Batenkov are investigated. Search for culture and his attitude to the enlightenment traditions are shown.

UDC 81'23

G.N. Semenova
NOUN COMPOSITES IN LANGUAGES WITH DIFFERENT STRUCTURE. PROBLEMS CONNECTED WITH NATIONAL WORLD VIEW FORMATION (CULTURAL AND LANGUAGE ANALYSIS)

Noun composites (complex double-component formations) common for all world natural languages as they contain cultural and historical potential are analyzed. Terms of ancient religious beliefs and cognation of Chuvash people, antroponimes and toponimes

(from comparative point of view) are used as illustrative material. All this proves that creative thinking of certain people is individual and it represents complex associative and psychological process.

UDC 328.16:681.3

V.V. Klykov, A.A. Eltsov, K.G. Shatlov
INTERACTIVE COMPUTERS TRAINING AIMED AT INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS

The article is devoted to interactive computer trainings in the integral calculus and differential equations discipline. Simulator, structure and some features of mathematical data input, analysis and output are considered.

UDC 621.3.048

A.A. Dulzon, V.Ya. Ushakov, V.V. Lopatin
THE DEPARTMENT OF HIGH VOLTAGE ENGINEERING AND ELECTROPHYSICS OF TOMSK POLYTECHNIC UNIVERSITY

The paper overviews the history of the department of High voltage engineering and electrophysics through the development of scientific research, engineers training and qualified personnel, and throughout TPU subdivisions' development, which were founded within the department. The main results of the department's activity for the period of 60 years are demonstrated.

UDC 621.311.25:621.039

A.F. Chemeris
RECOLLECTIONS OF COLONEL A.F. CHERMERIS. THE PERSON WHO ELIMINATED THE CONSEQUENCES OF CHERNOBYL CATASTROPHE

Recollections of Colonel Anatoli Fedorovich Chemeris, who eliminated the consequences of Chernobyl catastrophe in April 26, 1986 (head of the area № 3 of the Ministry of Mechanical Engineering of USSR, May-June, 1986. He is at present the Deputy Vice-Rector on TPU Administrative Affairs).

UDC 070:62(09)

G.G. Vendeleva
75 YEARS OF IRREPROACHABLE SERVICE

The article deals with the history of "Za Kadry", which has been TPU's house organ for 75 years. G.G. Vendeleva describes day-to-day activities of newspaper team placing special emphasis on the most creative, active and devoted reporters and editors.