Summaries

Churikov V.A.
LOCAL d-OPERATOR OF DIFFERENTIATION AND INTEGRATION OF FINITE REAL ORDERS OF FRACTIONAL ANALYSIS
Local d-operator of differentiation and integration of any finite real orders, which is the generalization of differentiation and integration operations of standard analysis, has been introduced. The possibility of constructing fractional analysis on the basis of d-operator was discussed. Particular cases of d-operator of non-integral and integral orders were obtained.

Denisov V.I., Timofeev V.S.
STABLE DISTRIBUTIONS AND ESTIMATION OF REGISTRATION DEPENDENCE PARAMETERS
The work is devoted to the problem of estimating the regression equation parameters. Using stable distributions the authors propose a new algorithm providing maximum reasonable estimation even in situations when a random error distribution has great variance. The carried out computational experiments proved the capacity of the developed algorithm and allowed giving a number of recommendations of practical use.

Berns V.A.
ON CONSTRUCTING CALCULATED MODELS OF DYNAMIC SYSTEMS BY TESTING RESULTS
The calculated models of dynamic systems have as a rule less number of freedom degrees than the original system. This number of freedom degrees equals the number of proper vectors; system oscillations in the developed frequency range are introduced by eigenvector decomposition. The work is devoted to the calculation investigations of dynamic system simulation errors by testing results.

Slobodyan M.S., Slobodyan S.M.
DESTRUCTION OF SLIDING CONTACT OBJECTS
A probable approach to the description of the dynamic of destructing object contact pair at minor body sliding on endless or closed surface of another body has been proposed. The possibility of applying stochastic chain device for diagnosing object sliding contact survival by the algorithms has been analyzed. 

Gavrilin A.N., Rozhkov P.S., Angatinka O.O., Moyzes B.B.
DYNAMIC VIBRATION DAMPER WITH AUTOMATIC VIBRATION FREQUENCY ADJUSTMENT SYSTEM
This article is focused on the devices used for protection of technical equipment from the effect of vibration. The considered dynamic model of damper allows selecting optimal inertia-dissipative elastic parameters of the dynamic damper for minimal level of vibration in equipment under protection.
implementing device for determining friction force and friction coefficient of individual elements within the twisted products were offered.

UDC 577.3:01;577.38
Borisov A.V., Trifonov A.Yu., Shapovalov A.V.
NONLOCAL REACTION-DIFFUSION FORMATION DYNAMIC OF TWO-DIMENSIONAL CROSS-SHAPE DISSIPATIVE STRUCTURES
The cross-shaped two-dimensional dissipative structures described by the Fisher–Kolmogorov–Petrowsky–Piskunov reaction-diffusion equation with nonlocal interaction and initial distribution localized around four centers have been numerically obtained. A structure form variation is considered subject to arrangement of the centers and equation parameters.

UDC 530.18+532.59+534.0+621.37
Romanov I.V., Ismailov I.V., Kolkanenko A.P., Poizner B.N.
NONLINEAR ADMIXING OF RADIO- AND VIDEO SIGNALS IN COMMUNICATION SYSTEM USING DYNAMIC CHAOS
The possibility of signal transmission and reception by the method of non-linear admixing and chaotic response on the basis of the dynamic system with nonlinearity possessing three minimums has been experimentally shown.

UDC 537.877
Meshcheryakov A.A., Gosenchenko S.G., Kizhner I.I.
THE INFLUENCE OF TROPOSPHERE REFRACTIVE INDEX INSTABILITY ON DIRECT VISIBILITY DISTANCE AND ERRORS OF MEASURING RADAR TARGET COORDINATES
The results of recovering vertical profile of refractive index by the data of atmosphere upper-air sounding over the sea in summer for five years of observation and analysis of its characteristic instability in relating to the issues of estimating accuracy of measuring radar target coordinates have been introduced. The data of sounding absent in scientific articles were used.

UDC 535.2:621.373.826
Lukin I.P., Eyuboglu H.T.
FORMATION OF BESSSEL BEAM AT CONIC FOCUSING IN TURBULENT ATMOSPHERE
Features of focusing Gaussian optical beam with arbitrary curvature of parabolic wave front by conic lens (axicon) in random-inhomogeneous medium have been studied. The analysis of the problem is based on solving the equation for mutual-coherence function of the second order of optical beam field. Medium intensity distribution of optical beam in longitudinal and cross sections to the direction of optical radiation propagation was calculated. The influence of random-inhomogeneous medium on changing radius of optical beam central part in focal distance range behind axicon was estimated. Stability criterion of space pattern of pseudo-Bessel beam formed in this way to the influence of arbitrary irregularities of the medium was obtained.

UDC 539.194:004.4
Bykov A.D., Emelyanov D.S., Stroynova V.N., Tyurin Yu.I.
APPLICATION OF SOFTWARE RELAX FOR COMPUTING OF RELAXATION PARAMETERS OF SPECTRAL LINES OF DIATOMIC AND TRIATOMIC MOLECULES
The software RELAX, which was applied for studying the influence of strong vibration excitation on parameters of molecule spectral-line profile has been developed. The variant of Ma–Tipping–Boulet of impact broadening theory was used in the software for computing half-width and shifts of line centers. The direct variation method was used at determining energy levels and wave functions of diatomic molecules, the effective Watson rotational Hamiltonian converted by Padé–Borel was applied for triatomic molecules. It was shown that considerable change of intramolecular dynamics at vibration excitation results in significant changes of half-widths and shift of line center formed by transitions to high vibrational states of diatomic and triatomic molecules.

UDC 544.733.422:519.87
Kudryashova O.B., Vorozhtsov B.I.
MATHEMATIC MODEL OF BLASTING GENERATION OF LIQUID–DROP AEROSOLS
Mathematical model contains equations describing the dynamic of changing thermodynamic parameters in the frame of blasting generator device of liquid-drop aerosols, flow process and sprayed drop size. The processes of aerosol cloud genesis and its further evolution were described. The criterion characterizing the efficiency of cavitation processes was found. The estimations of compression wave propagation time and flow time were obtained; the dependences of cavitation bubble size and aerosol particles on parameters of generator construction and substance characteristics were determined; aerosol particle size distribution was constructed; the regularly of changing the function of particle size distribution subject to the processes of coagulation, evaporation, precipitation were determined.

UDC 553.9.01
Vlasov V.A., Lutsenko Yu.Yu., Korepanova N.V., Zelenetskaya E.P.
THE FEATURES OF ELECTROMAGNETIC FIELD ATTENUATION IN PLASMA OF HIGH-FREQUENCY CAPACITIVE DISCHARGE
The results of measuring axial distribution of electric field harmonic components of capacitive discharge burning in argon and air medium at change of the main harmonic frequency have been introduced. Poly-resonant behavior of harmonic component attenuation in discharge plasma was determined. The influence of electron temperature and electron concentration of discharge plasma on frequency component attenuation was considered. Anomalous growth of the third harmonic component of electric field at decrease of discharge plasma electron temperature was determined.

UDC 533.9.07
Linnik S.A., Gaydaychuk A.V., Shamanin I.V.
THE SOURCE OF GLOW-DISCHARGE PLASMA WITH HOLLOW CATHODE EFFECT FOR MODIFYING SURFACE PROPERTIES AND COATING
The structure of the source of glow-discharge plasma with hollow cathode effect functioning in the pressure range from 10^{-2} to 10^{-4} Pa has been introduced. Titanium nitration process and plasma enhanced chemical vapor deposition of pyrolytic carbon covering to silica surface was experimentally investigated. The data on composition, thickness and micro-hardness of the obtained samples were introduced. The possibility of using the developed source both in nitriding and coating modes was experimentally proved.

UDC 621.315.592+004.942
Philippov M.M., Kochegurov V.A., Babushkin Yu.V., Gribenyukov A.I., Girsan V.E., Vorozbova G.A.
STABILIZATION OF CRYSTALLIZATION FRONT SPEED AT CRYSTAL GROWING IN MULTIZONE THERMAL INSTALLATION BY BRIDGMAN METHOD
Thermal conditions for crystal growing in Bridgman multizone installation have been optimized. Software of thermal condition continuous correction was used for stabilizing crystallization front speed. Information on changing temperature field at growth container motion in installation effective volume was obtained by the developed package of mathematical models. The behavior of crystal growth axial velocities for static and dynamic temperature growth regimes was studied. It was shown that application of temperature condition continuous correction allows stabilizing crystallization front speed and minimizing its deviation from nominal speed of growth container in the installation.
The results of experimental investigation of nitrogen influence on microstructure and micro-hardness of metal-ceramics alloy surface in a chamber with nitrogen-containing atmosphere have been introduced. The results of experimental investigation of nitrogen influence on microstructure and micro-hardness of metal-ceramics alloy surface at pulse electron beam exposure are given.

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The technique of polishing pin surface by a pulse electron beam of sub-millisecond duration, generated by a source of electrons with plasma cathode on the basis of pulse low pressure arc discharge being a part of vacuum device «SOLO», has been proposed and tested for decreasing injurious exposure of transosseous osteosynthesis pin. The method of grinding a pin front part in the form of drill was developed. It was ascertained that the proposed polishing of the pin surface in conjunction with a new form of grinding allow reducing the time of their getting through the bone tissue, decreasing heating and lowering pin injurious exposure during the whole immobilization period.

The possibility of using dual-energy X-ray absorptiometry for determining density of water-salt and water-alcohol solutions at various temperatures was shown. It is mentally determined that occurrence of foreign substances in dispersion changes the structure and multiple increase (in 5…6 times towards sample core) of surface micro-hardness is determined.

The results of analysis of elemental and phase composition, defect structure and micro-hardness profile of carbon steel subjected to combined treatment consisting in its electro-explosive copper doping and following electron beam treatment have been introduced. Cardinal change of the structure and multiple increase (in 5…6 times towards sample core) of surface micro-hardness is determined.

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