Annotations

CO OPERATIVE EFFECTS IN INELASTIC SCATTERING OF NEUTRAL PARTICLES

A. N. Almaliev, M. A. Dolgopolov, I. V. Kopytin

Inelastic scattering of slow neutrons and hard photons by the system of molecules, which were being in the super radiation state by the pump pulse, is theoretically investigated. It is shown that co operative effects can be creating in this case due to commutative symmetry. Namely, the scattering cross section is increasing when the difference of mass of nuclei in molecule is rising. In mononuclear molecules the cross section is zero. Consideration of the co operative effects resulting from interaction between particles of matter and common radiation field leads to appreciably changing of angular distribution of scattered particles.

THE ANALYSIS OF DIRECTIVITY PROPERTIES OF PLANE BICONICAL VIBRATOR

A. V. Ashihmin, V. K. Marshakov, A. P. Preobrazhensky

In the paper on the base of integral equation method the calculation of characteristics of plane biconical vibrator placed in free space and above infinite ideally conducted screen is carried out.

PHYSICAL INTERPRETATION OF PARAMETRIC EXCITATION PHENOMENON: ENERGETIC POINT OF VIEW

N. D. Birjuk, Yu. B. Nechaev, V. N. Fin'ko

It is discussed parametric excitation phenomenon of particular case on the basis of only physical considerations with using of simple energetic transformations. It is earmarked two special cases, synchronous and asynchronous ones. In the first case excitation is minimum, in the second case it is maximum. The proposing approach assumes generalization to complex cases, which not easy yield the physical interpretation.

CALCULATION OF SMALL-SIGNAL MODEL PARAMETERS AND NOISE CURRENT SOURCES OF SHORT-CHANNEL HEMT AT MICROWAVE FREQUENCY

A. M. Bobreshov, I. V. Khrebtov

The model for sub-micron HEMTs, taking into account the dominating short-channel effects, besides electron's drift velocity saturation, is proposed. Calculation is based on the fact, that in case of short gates, the transistor's threshold voltage changes due to the influence of these effects. On basis of this model the *I*—*V* and *S*-parameter characteristics were obtained using circuit design bundle DesignLab 8.0 and compared with experimental data. It was shown, that taking into account short-channel effects, increases the model accuracy. Also, the influence of these effects on transistor's small-signal model parameters was investigated, and a way for calculation of noise current sources of the equivalent scheme was proposed, using known minimum noise figure characteristics by its comparison with calculated ones.

THE ADAPTIVE COMPLEX FOR OPERATING REGISTRATION AND ANALYSIS OF AMPLITUDE-PHASE DISTRIBUTION APERTURE FIELD OF MILLIMETER WAVE STRUCTURES

D. N. Borisov, B. I. Vlasov, Yu. B. Nechaev

The algorithm of function and operation characteristics of the complex intended for automation of experimental researches and test instrumentations of millimeter wave structures are developed. For operating registration and obtaining of millimeter wave data the original electronic-scanning apparatus with exciting modulated probe in semiconductor's stratified structure and the additional measured procedure and data processing are used to perform the experimental array data, rectified from multiplicated distributions, that are caused by passive sounding method.

DEFINITION OF FACTORS ELECTRICAL CONDUCTIVITY STRUCTURES Si–SiO_2 A METHOD OF A PROBE OF KELVIN.

I. Y. Butusov, M. V. Grechkina

Let's consider a method of definition of factors electrical conductivity flat structures Si–SiO_2 at measurement of potentials of a surface SiO_2 of a probe of Kelvin.

OPTIMIZATION OF DETECTION ALGORIHTM OF FLUCTUATED RADIOPULSE WITH UNKNOWN TIME DELAY

A. V. Zakharov

Detection algorithm of rapid fluctuated random radiopulse with unknown time delay, obtained by maximum likelihood method and adaptive approach, is investigated. The minimization of detection error probabilities by means of optimization of weighted function duration is considered in the case of continuously differentiated signal modulation function. Universal structure-similar weighted functions, improving optimized detection characteristics, are proposed.

THE DEPENDENCE OF ALKALI-METAL ATOMS RADIATIVE CHARACTERISTICS ON ELECTRIC FIELD STRENGTH

A. A. Kamenski

The wave function and energy of alkali-metal atom fine-structure sublevels are obtained by perturbation theory for close-lying levels with the use of completely reduced Green's function. Polarizabilities of such states determine the analytical dependence of radiative transition probability on the field strength in the lowest order. The influence of anticrossing effect on the radiative atomic characteristics is investigated for the states with arbitrary quantum number.

METHOD OF CALCULATION OF MULTIPHOTON ABOVE-THRESHOLD IONIZATION OF HYDROGEN ATOM

S. I. Marmo

We develop a method which allows to calculate the amplitude of multiphoton ionization of hydrogen atom at frequencies tens times higher than the ionization threshold. For the three-photon process, the frequency and polarization dependencies are studied; in particular, we consider specific polarization effect of *elliptic dichroism*, which consists in dependence of angular distribution of photoelectrons on the sign of the photon helicity. The exact results are compared with the approximations used in calculations of multiphoton ionization of hydrogen.

INFLUENCE OF FLUCTUATIONS OF BUILT-IN CHARGE ON MOS-STRUCTURES ELECTROPHYSICAL CHARACTERISTICS

T. G. Menshikova, A. E. Bormontov, V. V. Ganja

The shape of volt-farad characteristics of MOS-structures has been investigated in the presence of statistic fluctuations of built-in charge at dielectric. Influence of charge fluctuations on energy spectrum of surface state density and the other parameters of MOS-structures was considered. Shown, when used common capacitive methods of determination of surface state density availability of fluctuations can lead to both overestimated evaluation that magnitude (regime of beneficiation and inversion) and underestimated evaluation (depletion regime). In last case this is appeared in form of «negative» density. Accommodation of fluctuations of built-in charge is also necessary for increase of accuracy control another electrophysical characteristics of MOS-structures by using capacity methods.

THE WIDEBAND PHASE MANIPULATED SIGNAL CODE ESTIMATION IN THE ACOUSTOOPTIC DEMODULATOR ON BACKGROUND OF NOISES

G. S. Nakhmanson, P. L. Mankov

The efficiency of the wideband phase manipulated signal code estimation in the acoustooptic demodulator on background of the external and internal noises in real-time is considered. The processing algorithm of the integrated photodiodes output signals is given. The expressions for the probabilities of the signal phase leap presence or absence determination for the given processing algorithm are found.

RECEPTION OF NARROWBAND RANDOMLY MODULATED SIGNAL ON THE BACKGROUND OF NOISE

V. I. Parfenov, S. V. Zolotarev

The model of the randomly modulated signal is offered and investigated, in which the random distortions inherent in any real signals are taken into account. The synthesis of non parametrical detector of such signal is executed and its efficiency is investigated. The analysis of the received characteristics and comparison them with the characteristics of known algorithms testifies to expediency of use of the offered algorithm.

DESIGN PROCEDURES FOR INDUCTANCES OF POWER HIGH-FREQUENCY PUSH-PULL MOSFETS

B. K. Petrov, O. M. Bulgakov, I. V. Semeykin

Techniques for calculations of gate, drain and source equivalent inductances of power high-frequency and microwave push-pull MOSFETs are submitted. Results of the calculations which have been carried out for two types of transistors, show, that comprehensible accuracy of calculations of is provided with application of simple computing procedures on the basis of linear operators. It is shown, that as against bipolar transistors, in MOSFETs equivalent intracoupling inductances are determined exclusively by geometry of assembly elements and do not depend on characteristics of transistor chips.

INFLUENCE OF CAPACITOR CURRENTS IN POWERFUL UHF MOS TRANSISTORS ON EFFECT OF OPENING OF THE PARASITIC BIPOLAR TRANSISTOR

B. K. Petrov, R. G. Grigoriev, P. A. Menshikov

The effect of inclusion parasitic bipolar n^+-p-n^- the transistor, in powerful HF and UHF MOS transistors working in a mode of amplification of the big signal is considered. Formulas for calculation of width drain p-n junction, barrier capacity drain p-n junction, and a voltage drop created proceeding under source n^+- a cell a hole current of recharging drain p-n junction are given.

ATOMIC BREMSSTRAHLUNG: RETROSPECTIVES, CURRENT STATUS AND PERSPECTIVES

M. Ya. Amusia

We describe here the «Atomic bremsstrahlung» (AB) — emission of continuous spectrum electro-

magnetic radiation, which is generated in collisions of particles that have internal deformable structure that includes positively and negatively charged constituents. The deformation of one of or both colliding partners induces multiple, mainly dipole, time-dependent electrical moments that become a source of radiation. The history of AB invention is presented and it's unusual in comparison to ordinary bremsstrahlung (OB) properties are discussed. As examples, fast electron—atom, nonrelativistic and relativistic collisions are considered. Attention is given to ion—atom and atom—atom collisions. Specifics of "elastic" and "inelastic" (i.e. radiation accompanied by destruction of collision partners) AB will be mentioned. Attention will be given to possible manifestation of AB in Nature and in some exotic systems, for instance scattering of electrons upon muonic hydrogen. Some cooperative effects connected to AB will be considered. New classical schemes similar to AB will be presented.

INVESTIGATION OF OXYGEN SUBLATTICE IN HIGH-T_c CRYSTALS BY CHANNELING TECHNIQUE

A. S. Borovik, V. S. Malyshevsky, S. V. Rahimov

The features of the oxygen sublattice in a crystal $YBa_2Cu_3O_7$ are investigated by channeling technique. The angular dependence of resonant nuclear reaction yield of ions He^+ from oxygen nucleuses at energy of ions 3.055 MeV channeled along <001> direction is measured. The best agreement of the calculated angular dependence of the reaction yield with experimental data are achieved at the assumption, that the oxygen sublattice are partly disordered (about 20 % of the oxygen atoms are random situated in the plane (110)) and the atoms of oxygen in oxygen chains are displaced from crystal sites at distance ~ 0.3 C in the plane (110).

NONLINEAR SCATTERING OF LASER PULSE BY ELECTRON IN PERIODIC POTENTIAL

P. A. Golovinski, P. A. Preobrahzenski

The classical model of a nonlinear scattering of intense pulse of laser radiation by an electron, taking place in a periodic potential field, is discussed. On the basis of the approximation of Kapitza—Dirac the complete analytical solution in the case of compressed pulse is obtained. The form of scattered radiation and its spectral distribution for various forms of initial laser pulses are found.

STRUCTURAL RESONANCES IN X-RAY SPECTRA OF RADIATION BY FAST CHARGES IN ELECTRON MATTER

V. K. Grishin

The practical possibility of observation of coherent polarizing bresstrahlung radiation (PB) by fast charges, arising at dispersion of own electromagnetic field of fast charges on atomic electrons in the condensed media, is considered. PB effect of inhomogeneity of medium electron distribution, appearing due to intratomic bonds and resulting in produce of radiation intensity oscillation, is noted. Main PB peak placed in low-frequency region has most intensity that corresponds to maximal coherency in radiation process. Besides in PB spectrum there are additional peaks in which differences of photon phases are multiple π. Influence of structure ordering of media on characteristics of coherent peak PB is analyzed. It is shown that medium structure regularity even low order results in sharp low-frequency displacement of coherent peak, though its amplitude grows proportionally to a square of ordering length («effect of diffraction grating»). Therefore possibility of its observation becomes rather problematic as here in low-frequency region there is also effect of coherent radiation suppression caused by self-suppressing of amplitudes of incident fast charge field. On the contrary, amplitudes of additional peaks, being proportional to square of ordering length, do not change position. In result, in the regular media first additional coherent peak grows sharply, that appropriates to condition of occurrence of PB kind — Resonant transition radiation.

THE DISCRETE FOURIER TRANSFORM AND ORTHOGONAL SYSTEMS OF CYCLIC SHIFTS

E. V. Akindinova, A. I. Barsukova, L. A. Minin

In this paper we study vector bases being cyclic shifts of a single vector. A case of even dimension space is considered. In this case orthonormal eigenvalue base is obtained for the discrete Fourier transform.

THE METHOD OF ITERATIONS FOR SOLUTION OF TASKS OF THE PLASTIC THEORY

N. D. Verveyko, A. V. Kuptsov

This paper considers the method of iterations for solution of tasks of the plastic theory. Linearization of conditions of plasticity reduces to hyperbolic system of equations. Characteristics of this system coincide with performances of the main nonlinear task. The field of stresses calculates by iterations on the parameter $\Delta k / k$ for $\Delta k / k \to 0$ where k is the limit of plasticity.

CONTINUOUS DEPENDENCE OF SOLUTIONS ON DATA OF INITIAL-VALUE PROBLEM FOR MOTION EQUATIONS OF NONLINEAR VISCOELASTIC MEDIUM

D. A. Vorotnikov

The work is considered with investigation of the initial-value problem for motion equations of a wide class of incompressible nonlinear viscoelastic

mediums in the whole two- or three-dimensional space. The main result of the work is a theorem on continuous dependance of solutions of the problem on the initial data and the given body force.

A FINITE-DIMENSIONAL MODAL CONTROLLER FOR DELAYED-PLANTS

A. V. Dylevskii, G. I. Lozgachev

The problem of designing the modal finite-dimensional controller for a delayed-plant is considered. The modal finite-dimensional controller design method is reduced to solving polynomial equations. The proposed method ensures to only stability of the closed-system but also the desired property of a transient response.

THE MOMENT FUNCTIONS OF THE SOLUTION OF INTEGRO-DIFFERENTIAL EQUATION WITH STOCHASTIC COEFFICIENTS

V. G. Zadorozhnii, E. A. Sirota

The formulas for the moment functions of the first and second order of the solution of the integro-differential equation with stochastic coefficients are found in the paper.

ASYMPTOTICAL AND SEMIGROUP PROPERTIES OF CAUCHY PROBLEM SOLUTION FOR ONE EQUATION OF MATHEMATICAL PHYSICS

Yu. V. Zasorin

In the paper the fundamental Cauchy solution for a 3-dimensional nonstationary equation of 5th order is being constructed in exact form. It helps to obtain solution of Cauchy problem for this equation. Also asymptotics and directions of rapid decreasing are being stated.

THE INVESTIGATION OF THE STRAIN FIELD PECULIARITY IN THE PLASTIC REGION OF THE GALIN'S PROBLEM

N. A. Kontchakova

The concern of this work is a consequent exploitation of the basis notions of the synthetic theory of strength to the problem of the calculation of the displacement field in the Galin's task. The possibility of the strain field jumping line realization is demonstrated. The numeric results for the task of the nonsymmetrical extension of the plate with the round hole reflects the influence the plastic displacement value on the position of the each point in the plastic region for the elastic-plastic solid having the brittle fracture properties.

ON AN ESTIMATION OF SOLUTIONS OF THE WAVE EQUATION ON A GRAPH WITH COMMENSURABLE EDGES

A. V. Kopytin

Consider the Cauchy problem for the wave equation on a finite graph Γ with commensurable edges

$$u_{tt} = \Delta_\Gamma u, \quad (1)$$

$$u(0) = \varphi, \ u'(0) = \psi, \quad (2)$$

where Δ_Γ is the Laplace—Beltrami operator on Γ. In case when Δ_Γ is symmetrical we prove the boundedness of all the solutions of (1), (2) and establish the corresponding estimation.

DYNAMIC CHANGES OF SPHERICAL CAVITY IN COMPRESSED ELASTIC-VISCOSITY-PLASTIC SPACE

A. V. Krivochenko, A. N. Sporikhin, A. S. Chebotarev

There's a definition of field of stress and shifts for compressed strengthening elastic-viscosity-plastic space, weakened by spherical cavity under the influence of dynamic forces in this work.

Problems of that kind arise when we both define the field of stress, deformations and transferences in mountain ranges with spherical cavities and when we research equilibrium of problems of that kind in which such solutions are used to define pre-critical state when $t \to \infty$.

The main difference of this work from the similar publications is that while calculating the fields of stress and transferences we took into account both associated and non-associated compression, which entitled us to give more completed description of physical-mechanical characteristics of the material as well to describe the influence of time on the changes of the inner radius of spherical cavity.

ON THE RESEARCH OF TRIANGULAR NORMS USING NORMALIZATION FUNCTIONS

T. M. Ledeneva

The purposeful approach to the forming of fuzzy operators has become a reality owing to the introduction of triangular norm (T-norm and S-norm). This paper deals with the representation of new parametric fuzzy operators from this class based on the special normalization functions. A strong negation for new operators as Sugeno's negation is obtained and studied.

GENERALIZED CONTRACTION MAPPINGS PRINCIPAL

A. I. Perov

For the investigation of systems of equations (algebraic, differential or integral) it is sometimes convenient to use instead of usual metric spaces and usual contraction mappings principal the metric spaces which are generalized the distance between elements is measured by vectors with non-negative components. And the role of contraction constant belongs to the matrix with non-negative elements, whose spectral radius is less than one (a-matrix) or equal to one (b-matrix). The article contains the detailed presentation of the generalized contraction mappings principal and of its different modifications.

ON THE PROPERTIES OF SOME RIEMANNIAN METRICS CLASS

I. P. Polovinkin

In this paper we considered a Riemannian metrics class of the following view

$$ds^2 = \sum_{i=1}^{n} x_n^{\mu} dx_i^2.$$

Some properties of these metrics were obtained. The equation system for geodesics was found as the system of the first order. We deduced that a nontrivial isometry group exists only in the case of the Euclidian geometry and Lobachevskiy geometry ($\mu = 0$ and $\mu = -2$ respectively).

CAUCHY PROBLEM FOR LINEARIZED KADOMTSEV—PETVIASHVILI EQUATION

M. V. Pridushchenko

In the paper the Cauchy fundamental solution for linearized Kadomtsev—Petviashvili equation is being build in exact form, and some properties (including asymptotical) are being studied. Also the Cauchy problem for the equation is being solved.

ON SOME AIR-TO-FUEL RATIO CONTROL ALGORITHMS FOR AUTOMOBILE ENGINES

V. V. Strygin, A. E. Polyakov, M. V. Kryachkov

The problem of air-to-fuel ratio control is considered. Continuous and discontinuous adaptive algorithms are proposed. Respected theorems on stabilization are proved. Reliability growth methods are considered.

ABOUT METHOD OF M. T. NAIR OF CONSTRUCTION INVARIANT SUBSPACE OF LINEAR OPERATOR

N. B. Uskova

M.T. Nair studied the following problem. It is considered two linear bounded operators A_0 and A, acting in Banach space, $\sigma(A_0) = \sigma_1 \cup \sigma_2$, $\sigma_1 \cap \sigma_2 = \varnothing$, P_1 is a spectral projector, which is constructed by spectral set σ_1. It is necessary found such bounded linear operator R and construct projector $P = P_1 + RP_1$ as the $\operatorname{Ran} P$ bee invariant under A. In this article the results of Nair is amplify: 1) Instead of bounded operators A and A_0 it is considered close linear operators, such that the operator $A - A_0$ admit prolongation to the bounded operator. 2) It is conducted the other prove of the main theorem and obtain the estimates on $\|R\|$ in the terms of norm of the block of perturbation. 3) In the case if $\sigma_1 = \{\lambda_1\}$, λ_1 is a simple isolated eigenvalue of A_0 the formula for the eigenvalue and eigne vector of A, with used R write out. 4) The condition for the operator $A - A_0$ is obtain for which spectral projector of the operator A is constructed.