

## ABSTRACTS

### Radioelektronika i informatika. 2003. № 4

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UDC 517.87; 537.958

**The Gauss's Electromagnetic Pulse Transformation by Pulse Perturbence of Half-Bounded Domain** / N.I. Slipchenko, O.N. Rybin, L.N. Shul'ga // Radioelektronika i informatika. 2003. № 4. P. 4-7.

Analytic solution of the problem of plane Gauss's electromagnetic pulse by rectangular pulse perturbence of both dielectric and magnetic permittivities in the time is derived. Physical analysis of derived results are carried out.

Ref.: 7 items.

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UDC 621.371.3

**Electromagnetic waves scattering on the grate of the resonant magnetodielectric spheres with the topological structure determination the geometrical progress** / A.I.Kozar // Radioelektronika i informatika. 2003. № 4. P. 7-11.

Solution of the problem on electromagnetic waves scattering on regular spatial lattice of resonant spheres were considered. The expressions for the scattered field were derived.

Fig. 4. Ref.: 5 items.

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UDC 537.87:621.371

**Numerical investigation of an electromagnetic field interaction with a nonstationary dielectric layer using the Volterra Integral Equations approach** / A.G.Nerukh, F.V.Fedotov // Radioelektronika i informatika. 2003. № 4. P. 12-15.

The application of the Volterra integral equations in time domain (VIETD) approach for investigation of the interaction of electromagnetic signals with a 1D time-varying dielectric layer is considered. Original software for the computer modelling of such a class of problems is developed. Numerical results are presented.

Fig. 6. Ref.: 6 items.

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UDC 621.372

**About some opportunities of shaping of an amplitude-frequency characteristic in cavity resonators of standing waves** / I.N. Bondarenko // Radioelektronika i informatika. 2003. № 4. P. 15-18.

The process of shaping of an amplitude-frequency characteristic (AFC) of resonators of standing waves as a superposition of a multitude of oscillations of an electromagnetic wave surveyed. The influence on AFC of quality of handling of an effective area of resonators argued. Usage of a profiling of effective areas as an expedient of shaping AFC of resonators of standing waves is offered.

Fig.1. Ref.: 9 items.

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UDC 517.958:537.8

**Plane electromagnetic wave scattering on an unclosed cone reflector** / V.A.Doroshenko, E.K.Semenova // Radioelektronika i informatika. 2003. № 4. P. 18-22.

The problem of plane electromagnetic field wave on a cone with periodical slots cut along rulings is considered. The plane wave propagates along the cone axis. It is shown, that electromagnetic problem is equivalent to the solution of the linear algebraic equations system for Fourier coefficients of scattered field components. The numerical algorithm for solving this system is constructed. Coefficients dependence on the conical structure parameters is studied. Slot dimension effect on scattered patterns is investigated for the cone with one slot.

Fig.12. Ref.: 12 items.

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UDC 538.574.6

**Numerical modeling of the prism elements in optoelectronics devices** / L.N. Illyashenko // Radioelektronika i informatika. 2003. № 4. P. 23-27.

The method of boundary integral equations combined with the method of analytical regularization is applied for highly efficient, fast and accurate numerical modeling of the prism elements of optoelectronic devices. With this method the fields in individual domains are presented as single layer potentials, which are the fundamental solutions of the governing wave equation. The method of conformal mapping is used to obtain the parametrical equations of triangular cross-section contours. Isosceles, convex and concave curvilinear prisms are considered and calculation results of the radiation patterns, total scattering and backward scattering cross-sections, and near field intensity are given. The algorithm proposed is applicable to the study numerous passive and active devices based on dielectric prisms of arbitrary polygonal cross-sections.

Fig. 7. Ref.: 10 items.

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UDC 658.51.011. 56

**An effect of form heat zone on maximum overheating device** / A.M. Sinotin // Radioelektronika i informatika. 2003. № 4. P. 27-30.

This paper presents the calculated functions and experimental data, which take account of impact form. Results presents of experimental research agree with calculated data.

Fig.3. Ref.: 3 items.

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UDC 621.391

**Algorithm of adaptive treatment of signals and hindrances in the aerial systems with introduction of artificial noises** / B.B Pospelov, M.V. Grushenko // Radioelektronika i informatika. 2003. № 4. P. 30-34.

Efficiency of the system realizing the algorithm of adaptation of facilities of informative exchange in the specific conditions of operation of aviation communication means is explored. Recommendations to be made use of when solving the problems of air force airplane modernization are the result of research.

Tab. 1. Fig. 8. Ref.: 8 items.

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UDC 517.958:536.71

**Simulation of the double hemicylinder electrode system through conformal mapping. Application to steady-state electrogenerated chemiluminescence** / A.I. Oleinick, C.A. Amatore, I.B. Svir // Radioelektronika i informatika. 2003. № 4. P. 35-38.

New simulated results for transient currents and electrogenerated chemiluminescence (ECL) intensities and also the analytical expressions for steady state currents and ECL intensities are derived for two-hemicylinder microelectrode assemblies operating in the ECL generation mode based on a specific conformal mapping transform are represented in this article.

Fig.4. Ref.: 15 items.

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UDC 621.396

**Generalized autoregressive model of the higher rank of non-gaussian processes** / V. A. Tykhonov // Radioelektronika i informatika. 2003. № 4. P. 39-42.

Analysis of non-Gaussian characteristics of stochastic processes allows acquire more complete information about process, complete and improve results received using correlation theory, find new solutions of statistical analysis problems. Researches in this as a rule are limited by cumulative or moment analysis and corresponding high-orders Fourier spectrums. A method for generalized linear prediction models building on the basis of moment functions is proposed in this article. Constructive advantages of linear prediction models allow significantly extend analysis capabilities of non-Gaussian processes.

Ref.: 9 items.

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UDC 519.7:007.52

**Modified algorithms for learning vector quantization neural networks** / O. Korolkova, N. Lamonova, I. Pliss // Radioelektronika i informatika. 2003. № 4. P. 42-44.

This paper considers algorithms for learning vector quantization neural networks. The algorithms allows to increase the speed of information processing and accuracy of classification by choosing an appropriate learning rate and the synaptic weights normalization.

Fig.2. Ref.:14 items.

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UDC 519.713

**The learning algorithm for formal neuron with polynomial activation function** / Ye. V. Bodyanskiy, N. A. Polushkina // Radioelektronika i informatika. 2003. № 4. P. 45-48.

In this paper artificial McCulloch-Pitts neuron simple activation function that satisfies all formal requirements is proposed. The learning algorithm based on Levenberg-Marquardt procedure that permits to tune both synaptic weights and function parameters and posses smoothing properties is introduced.

Fig. 4. Ref.: 11 items.

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UDC 519.5

**About one approach to construction the mathematical model of the program agent** / V.A. Filatov // Radioelektronika i informatika. 2003. № 4. P. 48-51.

In the article the approach to construction the program agent's model basis on the frame structure is considered. The formal approach is used in the theory of images. This approach is proved in the tasks of logic programming the interconnected program intelligence agents. The offered models can be used for development the multi-agent systems for administration of information resources in the distributed computing systems.

Tab.1. Fig.2. Ref.: 4 items.

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UDC 681.5

**Synthesis of Invariable Classificatory** / A.D. Polonsky // Radioelektronika i informatika. 2003. № 4. P. 51-55.

It is suggested the logical mathematical apparatus and adequate electrical basis to synthesize classificatory which are invariable as to the distribution of occasional signals under the condition of a-priori indefiniteness.

Tab. 1. Fig. 7. Ref.: 3 items.

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UDC 517.9+532.5

**About one method numerical modeling of convection viscous flow in simply connected and multiply connected domains** / M.V. Sidorov // Radioelektronika i informatika. 2003. № 4. P. 55-57.

Consider the time-independent convection incompressible viscous flow in simply connected and multiply connected 2D-domains. According to the R-function method and method of successive approximations numerical solution was build.

Ref.: 5 items.

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UDC 517.977.5

**The task of dynamic synthesis with vector control** / A.E. Radievski // Radioelektronika i informatika. 2003. № 4. P. 57-60.

Within the procedure of analytical construction of optimal regulators we consider the problem of dynamic synthesis for object with with vector control and additive perturbation actions.

Ref.: 11 items.

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UDC 519.85

**Minimum function estimations in constraint optimization problems on Euclidean combinatorial sets.** / I.V. Grebennik, D.O. Lapko // Radioelektronika i informatika. 2003. № 4. P. 61-64.

Optimization problems of convex functions with linear constraints on combinatorial sets reflected to Euclidean space are considered. Minimum objective functions estimations with taking into account constraints for variables are proposed for such problems. Solving of auxiliary problem with linear objective function is used for calculation of the estimations. The results of computing experiments are proposed and analyzed.

Ref.:14 items.

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UDC 621.391.883

**The analysis of the Gussian complex processes recognition algorithms** / A.V. Omelchenko, S.P. Golub, F.V. Kivva, O.A. Kolesnikov, A.A. Shapiro // Radioelektronika i informatika. 2003. № 4. P. 65-68.

The properties of the Gaussian random processes are considered. Analytical expressions for recognition error probability of two Gaussian random processes with different correlation functions are received, when the solution is based on the Bayesian rule. In accordance with established analytical expression the recognition working characteristics of the Gaussian stationary processes with exponential correlation functions are constructed. The received expression reliability is confirmed by the statistical simulation results.

Fig. 2. Ref.: 5 items.

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UDC 519.713:681326

**Topological Method of fault simulation for digital system** / I.V. Hahanova, I.N. Chugurov, A.N. Parfenty // Radioelektronika i informatika. 2003. № 4. P. 69-74.

Topological fast fault simulation method integrated the advantages of deductive and concurrent fault simulation algorithms and oriented on evaluation of digital circuit represented on gate or RTL description level is offered. The speed up of backward fault simulation is better on 10 times than methods with forward propagation algorithms.

Fig. 8. Ref.: 8 items.

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UDC 681.3+681.5:007

**The construction examples of consecutive algorithms of search of a point with a characteristic attribute, noiseimmunity to asymmetrical irregular virtual sequences** / N.V. Alipov, I.N. Alipov, L.N. Rebezyuk // Radioelektronika i informatika. 2003. № 4. P. 75-79.

For various parameters of a virtual asymmetrical sequence, in which the interval of time between the next emissions is casual size, the examples of construction of consecutive noiseimmunity algorithms of search of a point are given.

Tab.1. Fig. 4. Ref.: 5 item.

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UDC 621.397.26

**Calculations in real time scale for geometric image transformations** / Perkov R.V., Elakov S.G. // Radioelektronika i informatika. 2003. № 4. P. 79-81.

Therefore by analytical way obtained the mathematical associations, which allow to replace these operations with accumulating summation. The given replacement allows more than twice to magnify a computation speed, thus having an insignificant error concerning source formulas.

Ref.: 3 items.

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621.391: 517. 518:510.52

**One-dimensional discretely - continuous Fourier Transform on the basis of splines of the first order** / V.M. Udovichenko // Radioelektronika i informatika. 2003. № 4. P. 82-84.

The operators of one-dimensional discretely - continuous Fourier Transform are offered. The estimation of a reduced error of approximating of a modulus of complex function of real argument are obtained. The test example is offered.

Tab.2. Ref.: 11 items.

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UDC 623.762.004

**Definition of the moments of realization of the detailed maintenance of a composite technical system** / B.A. Demidov, O.V. Ivanchenco, D.A. Pivnev // Radioelektronika i informatika. 2003. № 4. P. 85-89.

The basic rules of a technique of definition of the moments of realization of the profound technical service of complex technical system with use of technical and economic parameters are considered. Is established, that the criterion of achievement of a limiting condition technical system, which is used for definition of the moment of realization is technical and economic. The moment of realization agrees techniques corresponds to the moment of time, when the level of non-failure operation of a product reaches an extreme allowable level, and the function of intensity of total expenses on purchase, operation and maintenance service technical system reaches the minimal meaning.

Ref.: 7 items.

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UDC 519.21

**The markov's processes with continued set of state stabilization for normal distribution.** / V.A. Dikarev, V.N. Evgrafov, K.V. Kobylinskiy, A.V. Kotelevtsev, V.N. Shershen // Radioelektronika i informatika. 2003. № 4. P. 90-92.

The problem of probability distribution stabilization of Markov process with continuous time and continued number of states is investigated. It is assumed that the infinitesimal matrix of the process varies under action of some perturbations. The methods of precision estimation process focusing are proved.

Ref.: 3 items.

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UDC 681.518:658.512

**Space-Path Based Approach to Modeling of Adaptive Development and Reengineering Processes for Complex Information Control Systems** / M.V. Tkachuk // Radioelektronika i informatika. 2003. № 4. P. 93-96.

The two groups of factors are stated, which bring influence essentially on development and reengineering processes of complex information control systems (ICS). Some existing models of so-called *information space* for software systems designing are considered, and their shortcomings are figured out. With a view to eliminate them the metaphor of a *multi-dimension information space (MIS)*, and a *phase path* for ICS representation in MIS is proposed. The MIS orthogonal projections and Euclidean distance are defined. This allows later on to elaborate some criteria for closeness of different phase paths in MIS, that in own turn can be used in order to construct some algorithms for crossing from some ICS current path to a target one, with has required parameters in one or several MIS-projections.

Fig. 6. Ref. 13 items.

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UDC 519.68; 519.7

**Use systemology approach by development of program systems** / S.I. Matorin, V.V. Kulibaba, E.A. Solovyova // Radioelektronika i informatika. 2003. № 4. P. 97-103.

This article presents the classifications used for the description of information processes in software. It's classification of information relations and classification of functions, varying the information. The model of knowledge based on the given classifications, can be used by development of the automated intellectual information systems, systems of imitating modeling, drawing up of the standards for the description a program component etc.

Fig.: 3. Ref.: 33 items.

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UDC 004.423.26

**Layered grammar and its application in syntactic analysis** / E.L. Leschinskaya // Radioelektronika i informatika. 2003. № 4. P. 104-108.

This article is about actual task of information analysis using formal grammars. Grammars are powerful in analyzing and generating information of different types. They combine such concepts as syntax and semantic. In addition, it is convenient to operate with hierarchical relations between symbols from left and right parts of production. Many grammar types, known nowadays, have several unpleasant peculiarities. Usage of "Layered grammar", which was introduced in this article, partly eliminates them. Layered grammar allows breaking rules into groups and as a result decreases number of potential conflicts between them during inference, appends ability of parallel analysis.

Fig. 1. Ref.: 4 items

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UDC 681.327.12.001.362

**Noise and local distortions filtration before segmentation process stage** / Gariachevskaja I.V. // Radioelektronika i informatika. 2003. № 4. P. 108-112.

The paper deals with the problems of colour images preliminary procession. The described methods and the obtained results evidence about expedience of using the noise control methods.

Fig. 4. Ref.: 5 items.

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UDC 519.81

**Shaping an ensemble of efficient variants when deciding the problems of structured syntheses of territorial distributed objects** / V.V.Beskorovainyi // Radioelektronika i informatika. 2003. № 4. P. 113-116.

The Problem of separation of subset Pareto-optimum deciding at the syntheses territorial distributed systems is considered. Method of shaping approximate area of compromises for the convex ensemble of alternatives is proposed. For methods of shaping the subsets of efficient variants, which select approximate area of compromises, evaluations of efficiency and time difficulty is brought.

Fig. 2. Ref.: 8 items.

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UDC 519.853+658.52

**Models and Methods for Solving the Routing Problems within a Technogeneous Accident Zone** / K.M. Koba, V.P. Putiatin // Radioelektronika i informatika. 2003. № 4. P. 117-124.

The routing problem is considered which is connected with the search of the optimal plans for population evacuation and emergency command routes and arises on developing of automated systems provided for liquidating the consequences of large-scale accidents that led to the state of emergency caused by an environment contamination. The methods for solving this problem are presented that are based on reduction of this problem to a system of basic problems of searching optimal routes and sharing of transport resources. For the obtained method the time complexity estimates are given.

Ref.: 8 items.

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UDC 539.173.84

**Simulation algorithm of the neutron passage through medium** / I.M. Prokhorets, S.I. Prokhorets, M.A. Khazhmuradov // Radioelektronika i informatika. 2003. № 4. P. 125-129.

The algorithm of calculation of neutron passage with energy up to 14 MeV through homogeneous medium and medium with fissionable material is considered. The simulation of neutron passage through plate and cylinder has been done. The obtained results are compared with existing literary data.

Fig. 4. Ref.: 9 items.

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UDC 681.3.06: 519.248.681

**About methods of an estimation of resistance to truncated differentials attack.** / V.I. Ruzhentsev // Radioelektronika i informatika. 2003. № 4. P. 130-133.

The existing methods of performing the estimation of the byte-oriented ciphers resistance to truncated differentials attack are considered. The approach allowing to estimate resistance of the feistel ciphers with rijndael-like round transformation and the large size of the block (more then 128 bits) to attack of truncated differentials is proved.

Tab. 4. Ref.: 6 items.

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UDC 519.21

**Formation of concentration fields of impurity for a case of an incompressible fluid** / I.S.Muravjova // Radioelektronika i informatika. 2003. № 4. P. 134-136.

The task of formation of concentration fields of impurity in a turbulent flow for a case of an incompressible fluid is considered. In particular, the mathematical model describing transport of dissolved substances in shallow reservoirs is given, and the numerical method of modeling of transport of the dissolved impurity is offered.

Fig. 1. Ref.: 4 items.

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UDC 534.03

**Mechanisms of nonlinear interaction of MM-range electromagnetic fields with debye (hypersonic) waves generated by a biobody: effect of the electroacoustic (phone/polarisation) echo** / Yu. V. Chovnjuk, T.N. Ovsyannikova // Radioelektronika i informatika. 2003. № 4. P. 137-140.

We will believe that the living matter of a biobody possesses piezoelectric capabilities which makes it possible to consider the physical mechanisms of the living matter response revealing itself as a two-pulse/ three-pulse echo to a probing mm-range electromagnetic signal.

Il. 6. Ref.: 2 items.

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UDC 621.391:51.142

**Hilbert spaces with reproducing kernels and their some applications** / S.V. Chumachenko // Radioelektronika i informatika. 2003. № 4. P. 141-144.

The approach to series summation in ГПБЯ is developed. New results for summation of one sign-variable series and the decision of the summatory and integral equations are obtained by proofing three theorems which are have theoretical and practical valuable.

Fig. 1. Ref.: 20 items.

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UDC 519.8.517.5

**Model of adaptation the teaching consequence of the decides** / V. A. Dorovskoy // Radioelektronika i informatika. 2003. № 4. P. 145-147.

The algorithm of work of intellectual system of professional training is considered. This one provides e choice of the tests at a subject domain according to abilities of the user, which is established through the special block of classification. To formalization of a level of complexity and rate of passage of the test the mathematical device of the theory of indistinct sets is used.

Tab. 1. Fig. 2. Ref.: 2 items.