

CONTENTS AND ABSTRACTS

RADIOENGINEERING, RADIOLOCATION AND COMMUNICATION SYSTEMS

V. V. Yezerky, I. V. Baranov, V. A. Bolonin, V. M. Davydochkin. THE ANALYSIS OF FREQUENCY DIFFERENCE SIGNAL SPECTRUM OF AN INSTRUMENT MEASURING THICKNESS OF FRESH ICE WITH FREQUENCY-MODULATED SIGNAL

Key words: measurement of fresh ice thickness, frequency modulated range finder, dangerous situations, criteria of detection.

The problem of the analysis of frequency difference signal spectrum of an instrument measuring thickness of fresh ice with frequency-modulated signal is considered. The aim of the work is to find out the features of spectrum allowing to define reliably the degree of danger being on ice for a person or a vehicle doing some work as well as simultaneously to measure ice thickness. By means of numerical modeling on the basis of theoretical formulas possible parities of amplitudes of separate components of the reflected signal in various typical situations in practically the whole range of ice thickness are defined. The comparison with experimentally received spectra of difference frequency signal is carried out and recommendations about criteria of detection of dangerous situations are formulated.

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A. I. Kalinkin, V. I. Koshelev, I. S. Kholopov. THE RESEARCH OF OBJECT COORDINATE MEASUREMENT ACCURACY BY THE OPTICAL MARKS IN AUTONOMOUS NAVIGATION SYSTEM

Key words: PnP algorithms, cluster, SVD-decomposition, affine transformation, rotation matrix, Euler angles, geometric dilution of precision.

The aim of the work is the investigation of the potential achievable estimating error of the object coordinates on the information from a single calibrated camera for different configurations of reference light emitters, placed on the object. It is shown that solving Perspective-4-Point problem for estimating object Cartesian coordinates is preferable to placing four reference optical marks in the form of an orthocentral tetrahedron with a base in the shape of an equilateral triangle, and for estimation of the angular coordinates – in the form of clusters, used in automatic docking systems.

DOI: 10.21667/1995-4565-2016-58-4-10-17 10

V. A. Belokurov. MOTION PARAMETERS ESTIMATION OF A SMALL OBJECT BASED ON SWITCHING OF MOTION MODELS

Key words: Gaussian particle filter, tracking before detection, low signal-to-noise ratio, motion models switching, first-order Markov sequence.

Detection of small objects with low signal-to-noise ratio, as well as the estimation of the parameters of its motion is a complex and urgent problem which is seen in radio and infrared range and direction detection, especially in conditions of inaccurately given model of the object. The aim of work is the synthesis of an algorithm of joint detection and estimation of the parameters of a small object motion. To solve this problem we propose to enter several models of the object into partial Gaussian filtering algorithm. In this paper, we consider two models of motion: linear motion and coordinate turn. Changing patterns of movement takes place on the basis of transition probabilities of simply connected Markov sequence model of the object. A comparison of the proposed algorithm and the well-known one on the basis of numerical calculation of a posteriori distribution density of state object vector is made. Numerical simulations show that the synthesized algorithm improves the accuracy of motion estimation parameters (up to 3,5 times) in the case of object maneuvering.

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V. G. Andrejev, H. L. Tran. PARAMETRIC SPECTRAL ANALYSIS WITH GAUSSIAN SHAPE UNIMODAL SPECTRUM FOR NOISY SIGNALS

Key words: spectrum, spectral estimation, restoration of autocorrelation coefficients, autoregressive model, autoregression, power spectral density.

We proposed and investigated a method of restoring autocorrelation coefficients of discrete autocorrelation function of random signals with Gaussian shape of power spectral density for the construction of parametric models. The aim of the work is to develop methods of improving the accuracy of spectral estimation of known signals in the shape of their spectral mode. The method is based on finding the optimum value of the width ΔFT of unimodal spectrum in Gaussian shape. Finding ΔFT gives an opportunity to restore distorted noise autocorrelation coefficients of a random process to improve the quality of its spectral estimation. Experimental research has shown that the proposed method makes it possible to reduce 1,4...6 times the discrepancy between the control and the measured spectrums in comparison with the known approaches to parametric spectral analysis, in particular, AR method. Increasing the adequacy of spectral estimation makes it possible to reduce in 3...6 times the length of analyzed time sample while maintaining achievable by other known methods of parametric analysis accuracy of spectral analysis. Winnings are achieved through the use of a priori information about the spectral properties of the process.

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E. V. Vasilyev, S. V. Kolesnikov, P. V. Zharikov. ENHANCED EFFICIENCY RADIO TRANSMITTER OF MOBILE OBJECT

Key words: unmanned vehicles, peak factor of radio signal, efficiency coefficient of radio transmitter, automatic amplitude control system, energy efficiency of transmitter.

The problem of improving the efficiency of radio transmitters having independent power supply and forming signals with large peak factor is considered. The aim of the work is to develop radio transmitter for mobile object or unmanned vehicle using automatic amplitude control system, allowing to achieve increasing efficiency of the transmitter without simultaneous deterioration in the quality of generated radio signal. A block diagram of 2,4 GHz band radio transmitter with autonomous power supply, providing an increased value of efficiency has been designed. The simulation and experimental verification of its stages has been performed.

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COMPUTER ENGINEERING, INFORMATION SYSTEMS AND TECHNOLOGIES

V. P. Koryachko, A. P. Shibanov, X. L. Fam. DATA CHANNEL MODEL WITH FAULT DETECTION AND DISASTER RECOVERY

Key words: data network, GERT-network, a first order loop equivalent simplifying transformations, the density distribution of the output values GERT-network queuing system M/G/1, Little's formula.

The aim of the work is to find probability-time characteristics of packet transmission process in failure and recovery systems. Models of random graphs are used. We give a solution to the problem using equivalent reforms simplifying GERT-network structure. The model is used with an arbitrary number of loops of the first order and algorithms with polynomial computational complexity. Distributions of packet transmission time on the channel at different values of the probabilities of equipment failures and channel performance recovery operations are found. Channel characteristics treated as M/G/1 queuing system are calculated. The values of the execution time of equipment recovery operations ensuring minimum permissible delays of transmission channel package are determined.

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S. V. Skvortsov, T. A. Pyurova. PARALLEL ALGORITHMS OF DATA SORTING AND THEIR IMPLEMENTATION ON CUDA PLATFORM

Key words: device, grid, kernel, graphic memory, block, thread, host, sort.

Theoretical and practical implementation of algorithms for parallel data sorting based on CUDA platform is considered. The relevance of this topic is due to the constant increase of the volume of sorted data at present time, and the demand to increase speed of information processing.

The aim of this work is a modification of known sorting algorithms for their effective use on CUDA platform, i.e. it is necessary to develop a program of parallel data sorting to compare its performance with sequential version and systematize the results. Thus, obtained results show that the use of graphics accelerator can significantly increase the speed of applications that use the algorithms of data sorting. With the growth of COP-operated arrays and the size of used blocks of work time, multi-threaded application on GPU is reduced several tens of times compared to the sequential implementation on the CPU, and with the increase in the number of blocks of winning increases.

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A. N. Ivutin, A. G. Troshina, D. O. Yesikov. PARALLELIZATION OF ALGORITHMS WITH USE THE SEMANTIC PETRI-MARKOV NETS

Key words: concurrent programming, Petri-Markov nets, semantic relations, semi-Markov process, simulation, transition function, paralleling technology, semantic net.

The aim of this work is to create a unified mathematical apparatus and methods for solving the problems of optimal parallelization algorithms in practical situations where parallel processes are implemented in a computer system with known processing speed, memory volume, communication channels and the number of processors. The problem of the development and application of mathematical apparatus of semantic Petri-Markov nets to optimize the time computational complexity of algorithms by their parallelization taking into account contextual dependence of the operators is considered. For the first time we offer the notion of semantic Petri-Markov net (SPMN) for simulation of context-sensitive relations in the algorithms that will allow to make structural parallelization of computational process, preserving the logic of interaction of individual operators.

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A. N. Pylkin, K. A. Maykov, A. V. Kroshilin, A. M. Belitsky. QUALITY SPLIT USING MODIFIED ALGORITHM OF FUZZY CLUSTERING OF RESEARCH DATA AND METHOD OF ITS CONSTRUCTION

Key words: fuzzy clustering, the evaluation function, system of decision making support.

The approach for solving the problem of evaluating the quality of partitioning in data clustering processes of control object on the basis of fuzzy equivalence relations is proposed.

The aim of this work is to develop criteria for evaluating the quality of segmentation obtained by fuzzy clustering for the optimization and effective use of information about control object, when using methods of data mining; the use of developed criteria for fuzzy clustering when selecting the best result of breaking. The resulting coefficients and the criterion of clustering quality to build the system of decision-making support are obtained. The method of fuzzy clustering using evaluation function of clustering quality for full formalization of clustering problem solution is developed.

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V. A. Minaev, A. O. Faddeev, N. A. Kuzmenko. 3-D MODELING OF DANGEROUS ENDOGENOUS GEOLOGICAL PROCESSES MIGRATION

Key words: modeling, energy migration, dangerous endogenous geological processes, horizontal and vertical displacements, geological medium, seismic and volcanic processes.

The aim of this work is creation and practical testing of spatial migration model of dangerous endogenous geological processes. Analysis of existing approaches to the modeling of these processes is performed. The conclusion about the prospects of geodynamic risks mathematical models for the solution of this problem is drawn. Description of three-dimensional mathematical model of dangerous endogenous geological processes energy migration and related computational procedure are given, boundary conditions of its existence are formulated. Novelty and

practical value of the model presented in the article are defined by variable thickness of model space, accounting of Mokho surface topography, spatial variability of elastic, viscous and density characteristics of geological environment, taking into account the Earth's surface curvature. It is shown that the trajectory of migration passes across those territories where sites of maximum horizontal and minimum vertical shift tensions concentrations are located. Besides, the conclusion is drawn that «stream» of endogenous geological energy with a high probability is passed from one deep level to another in conditions of «circulation» of horizontal shifts vectors in geological environment and increases of vertical shift tension. Results of mathematical modeling are adequate to really observed seismic and volcanic processes and phenomena.

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A. I. Martyshkin. ASSOCIATIVE COPROCESSOR MODULE BASED ON FPGA FOR SPECIALIZED COMPUTER SYSTEMS

Key words: module, associative memory, addressing, coprocessor, computer system, memory cell, fixation reactions, analyzer of multiple coincidence, memory addressing, bus interface, hardware implementation, priority analyzer, write cycle, read cycle.

The paper considers the possibility of implementing a module of associative coprocessor by modern element base for specialized computer systems. The aim of the article is the development and study of associative co-processor module on FPGA, for specialized computing, for example, multi-processor, systems, performing associative function and data storage functions. The object of research and development of this article is an associative coprocessor based on FPGA. The search operation is widely used by users and systems for different purposes. However, this operation is one of the most labor-intensive and time-consuming when implemented in traditional way, when search data is sequentially read from RAM to CPU, where they perform appropriate operations. The paper proposes associative co-processor connected to PCI bus of a computer system, providing search and comparison of «more – less» simultaneously in 32 words pre-loaded in associative memory. Finally, conclusions have been made. The use of VHDL language as a universal means of hardware description of integrated circuits provides the flexibility of the project and the ease of debugging the operation of the device. Modeling the associative co-processor was carried out in CAD Web pack ISE of Xilinx company. This allows to evaluate the correct operation of hardware coprocessor in the composition of computing systems without building actual layout. Introduction efficiency of the module is assured by the fact that the coprocessor performs time-consuming operation to search for and compare data and thus relieves CPU and increases the performance of computing system as a whole. The results obtained in the article can find application in search engines for different purposes: servers, databases, search machines used at stations, airports and for fast implementation of operating systems search tasks.

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S. F. Tyurin. FEATURES OF THE TRUTH TABLE INVERSION IN THE FAULT TOLERANT FINITE STATE MACHINE SYNTHESIS

Key words: Truth table, Disjunctive normal form, Inversion.

Fault-tolerant finite state machines may be built on the basis of special reliable logic elements. One way to improve reliability is to introduce redundancy elements. Basis 2OR-2AND-NOT implemented in CMOS transistor chain comprises two series-connected transistors, which enables to perform transistor redundancy, where the chain will include four serially connected transistors. This is the maximum value according to the limitations of Mead and Conway. In contrast to bases 2AND-NOT, 2 OR-NOT also allows such reservation, 2OR-2AND-NOT due to its duality provides a simpler scheme in most cases. In the synthesis of the elements in this basis by the truth table in DNF it is necessary to divide it into two parts, with the inversion of received sub-tables. In sub-tables inversion using De Morgan's law, which leads to the inversion procedure of each line, followed by the Cartesian product of the sets obtained. There are features of negation table with orthogonal variable—that is, in one sub-table of the table variable is meaningful, for example, zero, and the other sub-table – one. The use of such tables inversion allows to simplify general inversion algorithm and reduce the complexity of combinatorial syn-

thesis. It stands out as a table, in which all rows are mutually orthogonal. The aim of the work: to determine the negation table features with mutually orthogonal lines. It is shown that the rule of negation table from two rows with an orthogonal variable can be extended in the event of denial of orthogonal vectors.

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S. F. Tyurin, A. N. Kamenskikh. PARAPHRASE MAJORITY ELEMENT WITH THE SPASER INPUT

Key words: Majority element, CMOS Transistor, Self-Timed Circuits.

Fault-tolerant systems use redundancy with the choice, for example, «two of three», carried out by the majority element. To increase the probability of failure-free operation of digital equipment not one but three majority elements are often used. The implementation of the majority element in CMOS transistors requires 10 of these transistors. 5 p-conduction transistors realize a connection to power bus, 5 n-conduction transistors – connection to «zero volts» bus, with wiring diagrams having similar effect due to self-dual majority function. This produces a majority inversion function. To receive the majority itself inverse function arguments are required. Self-timed circuits (STC), promising in terms of energy efficiency and fault tolerance, use discipline paraphrase supply variables, and therefore simply realized paraphrase majority element. When all inputs are of the same value, for example, zero, at main and inverse outputs of majority element identical values (true) are set. However, in some cases, it is complicated by the fact that some of memory cells connected to the elements of the majority, have no such function. The aim of the work is to realize and study of majority element for STC with spacer phase. The simulation of CMOS majority element in NI Multisim 10 firm National Instruments Electronics Workbench Group circuit simulation system is carried out. We introduce enable input, providing spacer phase. Simulation confirms efficiency of the scheme. In order to increase the probability of failure-free operation triple redundancy enable input is performed. The patent of the Russian Federation is obtained for technical solution of the problem.

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A. N. Varnavsky, M. V. Goubko. CLASSIFIER FOR EVALUATING PREDICTION BY THE USER OF HIERARCHICAL TEXT MENUS ON «LIKE / DISLIKE» SCALE

Key words: hierarchical text menus, menu options, user performance, psychophysiological testing, memory performance and attention level of logical thinking, «like / dislike» evaluation, logistic regression.

The article is the result of building a classifier to predict the evaluation made on «like / dislike» scale by the user of hierarchical text menus. The aim of work is to research the influence of structural parameters of hierarchical text menus and individual psycho-physiological characteristics of user's satisfaction with user experience with menu and to build the classifier based on the results of study. An experiment in which participants worked with 10 different developed hierarchical text menus and then evaluated the usability of each menu on «like / dislike» scale is made. Also, the subjects were psycho-physiological testing. On the basis of experimental data the classifier was built, i.e. logistic regression to assess whether the user likes the menu with set parameters of specific values of memory performance, attention and level of logical thinking. The resulting model allows us to classify correctly 78 % of various menus estimates. The results can be used in the development of hierarchical text menus for various programs.

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SYSTEM ANALYSIS, CONTROL AND INFORMATION PROCESSING

A. E. Kuznetsov, A. S. Ryzhikov. PROGRAM IMPLEMENTATION OF REFERENCE RASTER MAP BASED ON SATELLITE IMAGES FROM «LANDSAT-8»

Key words: control of georeferencing accuracy, reference raster image, identification of corresponding points, application programming interface (API), digital watermark.

The aim of the work is to organize the storage of reference raster image of the Earth's surface used for automatic control of geodetic connection of satellite images from «Canopus-B» and

«Resource-P». We proposed and analyzed two variants of constructing video data array storage in volume of about 2 terabytes, consisting of different-scale tiles. We argued the choice of relational database and database scheme for storing the tiles, attribute and technical image information. Programming interface for quick access to reference fragments the geodetic reference control program implemented in language C++ is described. The choice of the mechanism to protect reference satellite images from unauthorized distribution is analyzed.

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V. A. Maksimov, I. S. Kholopov. PROJECTIVE DISTORTION CORRECTION ALGORITHM AT LOW ALTITUDE PHOTO/VIDEO SHOOTING ON THE DATA FROM INCLINOMETER AND RANGE METER

Key words: low-altitude photo / video shooting, projective distortion correction, homography matrix, object contour, vanishing points, camera calibration, MEMS accelerometer.

The article deals with the correction (form recovery and true mutual disposition of objects) algorithm of projective image distortion at low altitude photo/video shooting, based on a mathematical model of virtual camera. The aim of the work is a comparative analysis of given algorithm with correction algorithm based on finding corresponding points (vertices of n-gon, describing object contour). Correction quality criteria – maximum absolute value of difference between the angles of n-gon in the images without projective distortions and after the correction is introduced. Experimental results with calibrated web-camera Logitech C270 showed that having relative error of distance estimation to shooting surface, as well as camera pitch and roll not more than 5 % then correction algorithm with virtual camera provides absolute error of reduced object form not more than 3°.

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M. V. Stremoukhov, M. V. Ilyushin, V. V. Dvoryadkin. LOW CONTRAST AND NARROWBAND IMAGE CODING BASED ON NONLINEAR FORMING SYSTEM

Key words: low contrast and narrowband image coding; quality of image compression; parametric coding; nonlinear forming system; nonlinear relationships.

In course of information support of subscribers the problem to transmit video information received in conditions of low luminosity arises. The images acquired in difficult environments, such as faint of illumination intensity, precipitations, fog, smoke and etc., are characterized by low contrast and narrow dynamic range (or narrow band). The standard methods like this image coding do not support of the control information exchange demanded quality.

The aim of the work is to develop algorithms of effecting coding and decoding of the images like that on the basis of parametric nonlinear coding of video information considering nonlinear dependencies between image elements. The authors suggest parametric images coding method, based on nonlinear forming system parameters optimization at given stimulus sequence. Experimental results show that the offered method provides higher quality of restoration while coding image of a certain type.

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INSTRUMENT ENGINEERING AND INFORMATION-MEASURING SYSTEMS

Quang Minh Vu. CONTROLLABILITY «IN SMALL» IN PROBLEMS OF DYNAMICS OF A MICRO-MECHANICAL GYROSCOPE

Key words: micromechanical gyroscope, forced linear oscillation, differential equations, controllability «in the small».

The application of micromechanical gyroscopes in various technical devices is currently widespread. At the same time expanding the scope of micromechanical gyroscopes requires solving a complex of new, specific tasks, one of which is to control the gyro «in the small», in cases where the area of the control for technical reasons is limited. We consider the problem of control «in the small» for the controlled movement of sensing element of a micromechanical gyroscope. The aim of work is studying controllability «in the small» for linear systems describing

the dynamics of oscillator micromechanical gyroscope with sensing resonator in the form of elastic plates with boundary condition cantilevered plates in the forced oscillation mode at a slow change in the natural frequency of oscillation, the angular velocity of the base, the amplitude and frequency of external influence. It is described how resonator performs a periodic motion under the action of electrostatic control system. Measurement of that motion allows determining the rotation of the gyro foundation in inertial space and assessing the accuracy of measurement of angular velocity of the base. Model experiments illustrate theoretical calculations.

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V. F. Odínokov, S. I. Kholopov. CONTROL MODULE OF THE PROGRAM TO DEFINE TRANSFER FUNCTIONS OF INFORMATION-MEASURING SYSTEM ELEMENTS AND UNITS

Key words: transfer function, linear circuits, circuit connections of transmissibility, topological modeling.

Methodical bases and the program of main module for calculating transfer functions of based conductivities schemes on their topology are considered. The algorithms of software automated topological search of transfer functions formulas using MATLAB for a number of linear electric circuits are presented. A description of the algorithms contains relevant analytical ratios. The recommendations on the use of algorithms to obtain transfer functions for some simple topologies of electrical circuits containing a combination of passive electrical elements are given. The description of verification methods of calculation results of conductance circuit transfer functions is given. The aim of the work is methodological study and the development of software control module for automated calculation of circuits transfer functions presented in the form of compounds of the transmissibility LCR-circuits elements.

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M. A. Ivanov. CONTROL AND MONITORING MODULES OF INFORMATION-MEASURING AVIONICS SYSTEMS

Key words: information-measuring system, transceiver modules, L-range, avionics, design.

Powerful module to control information-measuring systems of L-range avionics has been developed. The module has a set of common functional devices to transmit and receive channels. The choice of element base, management control modes and work, as well as isolation between channels transmission / reception provide no self-excitation loop. The module provides bandwidth of 1 – 1,55 GHz, gain of the pulse signal with 1 watt to 100 watts. The spread of power output between the products in the lot under normal climatic conditions showed ± 1 dB. Main output experimental characteristics of the module completely meet the requirements of technical specifications due to the integrated approach on the stage of circuit design.

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ELECTRONICS AND NANOELECTRONICS

V. K. Bazylev, A. M. Zhidkov, V. A. Korotchenko, V. E. Skvortsov. COMPUTER MODELLING OF ELECTRON MOTION IN ORBITRON VACUUM SENSOR

Key words: orbitron vacuum sensor, computer modeling, motion of electrons.

The results of computer modeling of electron motion in orbitron vacuum sensor are shown. It is shown that in an idealized structure without the potential well of the cathode an electron passes iteratively on a spiral path between the ends of cylindrical electrodes. It is found that the spiral step decreases with increasing particle axial coordinate starting points and return to the starting point is moved azimuthally over time, because the length of the electrodes is not usually an integer number of turns of the helix. The aim of the work is obtaining quantitative motion characteristics of electrons in a vacuum orbitron sensor for different parameters of electrode system with the help of modern computing facilities.

DOI: 10.21667/1995-4565-2016-58-4-146-152 146

A. E. Lunyakov, N. V. Rybina, N. B. Rybin. RESEARCH OF DEPENDENCE OF CORRELATION PROPERTIES OF NANOSTRUCTURED SURFACES ON THE PARAMETERS OF THEIR RELIEF

Key words: Nanostructures, order, quantum dots, surface, self-organization, average mutual information, maximal mutual information, two-dimensional detrended fluctuation analysis, correlation properties, scaling index.

The aim of the work – modeling characteristic surfaces with quantum dots and research of their information and correlation properties by the methods of 2-dimensional detrended fluctuation analysis (2D DFA) and average mutual information (AMI) to create database with correlation and information parameters of these structures.

The aim of scientific work is research of dependence of correlation properties of nanostructured surfaces on the parameters of their relief. The topicality of the problem of self-organization materials with quantum dots in electronics was formulated. The surfaces with quantum dots with varying degrees of noise of their relief were simulated. The studying of simulated nanostructured surfaces by the methods of average mutual information and two-dimensional detrended fluctuation analysis was performed. The scaling index and information characteristics dependences on the degree of noise of nanostructured surfaces were plotted. The corresponding conclusions about obtained dependencies were made.

DOI: 10.21667/1995-4565-2016-58-4-153-158 153

A. E. Chizhikov, I. S. Runkin. RESEARCHING THE POSSIBILITY TO DEVELOP THE CAPACITORS WITH FREQUENCY DEPENDENT CAPACITY

Key words: single-layer dielectric structures, dielectric permittivity, electrical conductivity of dielectric, migration polarization, electric capacitance, glycerol, electrode system.

For double- and single- layer dielectric structures with increased electroconductivity calculated relations for real and imaginary parts of dielectric permittivity were derived. The absolute values of dielectric permittivity in the range of frequencies from single digit hertz to megahertz were calculated. The range of known materials which can be used as dielectric layers was defined. Based on capacitor structure with paper dielectric soaked in glycerol the change of capacity from fractions of nF to several thousands of nF with change of frequency from 105 Hz to 0,1 Hz was experimentally achieved. Experimental research confirmed correctness of conducted calculated analysis. The advantage of such capacitor in case of passive low-pass filter was shown.

Aim of the work – is the study of possibility of capacitor development with frequency dependent capacity based on structures with increased electroconductivity.

DOI: 10.21667/1995-4565-2016-58-4-159-164 159

M. V. Kazakova, D. V. Karachinov, D. A. Evstigneev, K. A. Zverev. POWER PARAMETERS OF TELEVISION SYSTEM WITH SiC – DETECTOR BASED ON METHOD OF FOCUS LATTICES FOR TEMPERATURE MEASUREMENT OF GAZ FLOWS

Key words: energy calculation, contrast, luminosity, heat flow, point lattices, image, television system, SiC-detector.

The development of new methods to visualize and register high temperature heat flows allows to increase measurement accuracy of their temperature fields. Television laser-shadow system presented in the article being based on the method of defocused lattices allows to measure the temperature of gas flows by changing the indicator of SiC-detector refraction. In the process of heating the surface of the detector produces optical heterogeneities which are projected onto CCD matrix. Geometrical characteristics of the shift and curvature of point lattice allow to estimate the parameters of homogeneities.

The aim of the work is to develop new methods to calculate energy characteristics of a system allowing to evaluate the contrast and luminosity of the images received. The results obtained in the process of calculating energy parameters of television system prove the possibility to form contrast images and allow to find optimal parameters of point and linear lattices.

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