

FINITE-ELEMENT ANALYSIS OF MAGNETIC FIELD DISTRIBUTION NEAR THE SUPERCONDUCTING TORUS

A.A. Kudryash, G.E. Shunin

The results of a 3D finite-element analysis of a magnetic flux density distribution around a superconducting torus in the Meissner state placed into the external homogeneous magnetic field of different directions with respect to torus axis are reported. The coordinates of points where magnetic flux density achieves minimum are obtained as well as moments of forces acting on the torus

Key words: superconducting torus, magnetic field, finite-element analysis

MAGNETIC IMPEDANCE IN AMORPHOUS ALLOY FOR FREQUENCY Fe74P18Mn5V3 0,5 ÷ 100 MHz

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A study of magnetic impedance effect dependence of external constant magnetic field tension for and amorphous metal alloy Fe74P18Mn5V3 in the frequency range 0.5-100 MHz is carried out

Key words: magnetic impedance, skin-effect, high-frequency measurements, eddy current, magnetic permeability

INFLUENCE CHROMIUM AND VANADIUM ON THE CONSTRUCTION OF STRUCTURES OF LOW-CARBON WHITE CAST IRON

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On the basis of X-ray spectral and carbide analysis by thermodynamic calculations yielded the dependence characterizing the effect of carbon and chromium on the critical content of vanadium in relation to low-carbon steels, cast iron and hypereutectoid. The estimation of the required content of vanadium in the complex - alloyed white irons

Key words: white iron, chromium, vanadium, alloying, composite structure

HEAT DISTRIBUTION PROPERTIES OF EPOXY MATRIX MODIFIED WITH FINELY DISPERSED CARBON FILLERS

A.O. Kamaev, O.N. Shornikova, A.V. Solopchenko, A.V. Kepman, A.P. Malaho

Polymer matrix composites are one of the most numerous and diversified material types. They are applied in different fields of technology and bring useful economy. Material with required properties can be gotten by varying matrix and reinforcement composition, their ratio and reinforcement orientation. It was shown that carbon fillers addition increases curing temperature range of epoxy and decreases glass transition temperature of the hardened binder. It was found that heat distribution properties improves even at small amounts of carbon filler. The highest values are observed for dispersed exfoliated graphite and dispersed graphite foil

Key words: epoxy, carbon fillers, heat distribution

STRESS FIELD IN METALLIC GLASSES HEVE SHEAR BANDS TYPE WAVY RAY

A.A. Rumtsau, O.M. Ostrikov

The method of calculating the stress field at the shear bands have been considered on the anvil of metal glass. These bands are located near the surface and have the shape of curved beams with harmonic component formed. It is based on the dislocation approach description of the plastic deformation in an metallic glass. Mathematically modeled

the process of deformation and as a result of the stress field are described in the material caused by the shear bands in different planes. It makes possible to predict the development of cracks and their direction

Key words: metal glass, shear band, dislocation approach

INFLUENCE OF FINELY DISPERSED CARBON FILLER ON MECHANICAL PROPERTIES OF EPOXY MATRIX

A.O. Kamaev, O.N. Shornikova, A.V. Solopchenko, A.V. Kepman, A.P. Malaho

Polymeric matrices for composites have a number of unique properties. Their improvement is actual task for researchers. Material with required properties can be gotten by varying matrix composition and proper selection of modifier. It is known that modifier with graphite nature improves electric and thermo conductivity, but its influence on mechanical properties is uncertain. It was shown in this research that strength and fracture toughness of modified polymeric matrices become worse, but tensile and flexure elastic modulus increases. It was found that water absorption of samples increases with modifier addition without dependence of its nature and concentration

Key words: epoxy, carbon fillers, mechanical properties

CRYSTALS AND PACKAGES OF SEMICONDUCTOR PRODUCTS

V.V. Zenin, B.A. Spiridonov, A.I. Zemlianskiy, D.I. Bokarev

Potentiometric method investigated the corrosion resistance in various environments aluminum metallization obtained by thermal vacuum deposition of SiO_2 on the silicon crystal and galvanic deposition for the case of covar. An appreciable difference in corrosion resistance of Al-plating in an acidic environment compared to neutral

Key words: corrosion resistance, aluminum metallization, chip, packages, semiconductor devices

INTELLIGENT SYSTEM FOR IDENTIFICATION OF OBJECTS USING THE ALGORITHM OF IMMUNE SYSTEMS

Yu.I. Eremenko, I.V. Melnikova, A.A. Shatalov

The article presents research into possible application of immune algorithm of clonal selection for building a Russian-language system for author identification based on handwriting. Complex of programs, that allows testing different modifications of algorithm, and database of handwriting samples were developed

Key words: intelligent system, handwriting identification, expertise, individual's identification based on handwriting, the algorithm of clonal selection

MATHEMATICAL MODEL OF THE COHERENT STRINGS-SPRING SYSTEM

M.G. Zavgorodnij, S.P. Majorova

Modeling of processes in branched engineering networks requires the development of new approaches to the construction of models without decompositions, which described the engineering network as a whole. In this paper, a mathematical model of deformation of coherent strings-spring system in the form of a boundary value problem defined on a geometric graph (network). Proved unique solvability of the obtained boundary value problem

Key words: mathematical model, graph, boundary value problem

MULTICRITERIAL OPTIMIZATION MODEL OF COMPONENT SELECTION WHEN DESIGNING MEASUREMENT SYSTEMS LRE (LIQUID-PROPELLANT ROCKET ENGINE)

A.S. Kolesnikov, Ya. E. Lvovich

The article is to find the optimal selection of components measuring systems LRE with using multicriterial optimization model, the mathematic formulation of the problem of optimal choice and the choice of an optimal algorithmic structure

Key words: measuring system, multicriterial optimization, algorithmic structure, sensors, optimal choice of design solution

ALGORITHM OF SEARCHING OF OPTIMAL CASE OR COMPONENTS DEPLOYMENT IN DESIGN PROCESS OF INFORMATION SYSTEMS OF DRONES MANAGEMENT

A.A. Ryndin, S.V. Sapegin, D.V. Dolgikh

Features of optimum planning of software components deploying between drones and control station are considered. The problem of using drones as components in business process automatization are investigated

Key words: drones, automated control stations, corporative IS

APPROACH TO ADDRESS DATA PROCESSING IN THE RADIO MONITORING SYSTEMS WITH DATA BUFFERING

D.A. Alekseev, V.A. Kozmin, A.B. Tokarev

The article analyzes the problem of identifying and separating certain radio signals by radio monitoring system. It is shown that it's required new approaches to data storage and processing because of the extension of radiofrequency ranges, augmentation the volume of transmitting information, the more active usage of burst signals in relation to searching and separating the specific group of signals from similar ones. The advantages and disadvantages of different systems, which use the buffering of processed data streams, are discussed

Key words: radio monitoring, data buffering, address signal processing

ANALYSIS OF EXISTING STRUCTURES OF ANTENNA ELEMENT FOR DF ARRAYS

K.O. Volkov, Yu.G. Pasternak, K.A. Razinkin, S.M. Fedorov

The characteristics and features of different antennas suitable for use as elements in the DF array are reviewed

Key words: direction finders, broadband antenna

APPLICATION OF GOERTZEL ALGORITHM FOR DIRECTION FINDING OF DIFFERENT SOURCES BY THE STREAM OF SHORT PULSES

M.I. Spazhakin, A.B. Tokarev

The problem of fast energy detection of narrow-band impulse radio signals for direction finding is analyzed in this article. High frequency selectivity of equipment is essential condition of effective digital processing, when there is strong interference close to the frequency of detecting signals. Wide frequency bandwidth can be divided into sub-bands by using a block of digital filters with finite impulse response. Narrow band filtering can be implemented by using of sliding

Goertzel algorithm in each sub-band. The recommended processing flow chart and structure of filters based on the Goertzel algorithm are proposed. The results of compare static and dynamic selectivity of filter are performed

Key words: radio monitoring, direction finding of short time radio impulses, Goertzel algorithm

SOFTWARE AND HARDWARE SYSTEMS TO ASSESS THE EFFICIENCY AND NOISE IMMUNITY OF DIGITAL COMMUNICATION TOOLS

S.N. Panychev, E.N. Gluschenko, N.A. Samotsvet, S.V. Surovtsev

The description of the methodology and hardware to ensure efficacy and noise immunity of digital radio communications, on the basis of which a specialized software and hardware. A brief description of the principles of design of hardware and software

Key words: hardware and software system, noise immunity, design

HIGHLY TECHNOLOGICAL (HI-TECH) ANTENNA LEAKY WAVE DIFFRACTION GRATING WITH A PERIODIC COMB

D.Yu. Kryukov, A.V. Ostankov, Yu.G. Pasternak, V.I. Yudin

Leaky wave antenna is considered on the basis of a single-wire coaxial transmission line, screened-diffractive reflective grating with a periodic comb structure. A electrodynamic modeling diffraction of the synthesized antenna and shows the most significant results

Key words: periodic comb, surface wave, directional radiation, modeling

THE DETERMINING PROTECTION RATIOS IN TELECOMMUNICATION DEVICES USING AND PHASE FSK SIGNALS

I.S. Bobylkin, I.V. Ostroumov, A.Yu. Savinkov

The developed technique of definition of the protective relation which allows to determine without carrying out highspending tests the protective relation by a high-frequency path and intermediate frequency for the radio-electronic means using faze- and the frequency manipulated signals, rather different types of a pulse and continuous radio noise on a basis the faze manipulated of signals corresponding useful, the frequency-modulated signals and signals modulated on frequency by harmonious or sawtooth tension is presented in article

Key words: modulation, value of the protective relation, communication system, intermediate frequency

ANALYSIS OF PERSPECTIVE AREAS OF ULTRA-WIDEBAND ANTENNAS BASED LUNEBERG LENS DESIGNING

Yu.E. Kalinin, Yu.G. Pasternak, S.M. Fedorov

This article is devoted to analysis of existing advanced technological solutions in design of ultra-wideband antennas based on a planar Luneberg lens

Key words: beamforming scheme, UWB antenna

SALES LDPC- DECODER MASSIVELY PARALLEL COMPUTING DEVICES

A.V. Bashkirov, A.Yu. Savinkov, M.V. Horoshaylova

This paper presents the architecture LDPC- encoder and decoder. The comparative results of simulation mo-LDPC code in parallel and serial heterogeneous systems using the CPU and GPU. In kettle saving in decoding time and complexity of hardware implementation

Key words: architecture, coding, LDPC code

OVERVIEW OF ADVANCED DESIGNS OF BROADBAND DF ANTENNA ARRAYS

K.O. Volkov, Yu.E. Kalinin, Yu.A. Rembovsky, S.M. Fedorov

In this paper, an overview of different types of antenna elements and arrays, suitable for use in the DF devices are given. Describes important for solving DF problems antenna characteristics

Key words: direction finders, broadband antenna

BASED ON OPTIMIZATION OF HARDWARE ARCHITECTURES LDPC- DECODER USED IN THE STANDARD RADIO IEEE 802.11N

A.V. Baschkirov, A.V. Sitnikov, M.V. Horoshaylova

In the article the block diagram of a decoder systematic LDPC code presented classes Architech tour, given their description and comparison. The analysis and selection of the optimal algorithm in terms of hardware implementation

Key words: architecture LDPC coding code standard IEEE 802.11n, algorithm Sum-product, algorithm Min-sum

COMPLEX MODELLING AND OPTIMIZATION OF CHARACTERISTICS IN THE COURSE OF DESIGN DESIGN OF RADIO-ELECTRONIC MEANS

O.Yu. Makarov, A.V. Turetsky, N.V. Tsipina, V.A. Shuvaev

In this article we propose a comprehensive approach in defining and optimizing the characteristics of REM in the design process. This is such as thermal characteristics, mechanical characteristics, the characteristics of the electromagnetic compatibility (EMC), and reliability. Proposed structure of the techniques necessary for the implementation of this approach. The structure of the process of optimization of designs REMs and the complex of mathematical models to analyze the characteristics of structures REM

Key words: radio electronics, design engineering, systems modeling, optimization

DEVELOPMENT METHOD OF FORMING LIMIT LINE BAND EMISSIONS COMMUNICATION SYSTEMS WITH PHASE-SHIFTED SIGNALS

A.V. Muratov, I.V. Ostroumov, M.A. Romacshenko, A.V. Sitnikov

The paper presents the developed method of forming limit line-of-band emissions and phase-frequency signals manipulated by the apparatus allows the fast Fourier transform to obtain the spectral characteristics of phase-shift keyed signal having a complex form of representation on the time axis and a complex shape SPMI. Block by block construction program developed as a set of consistent procedures can easily modify it for the consideration of other types of signals or additional effects on the emitted signal

Key words: modulation, simulation model, phase-shift keyed signal communication system

DECODING ALGORITHM FOR BINARY LOW-DENSITY-CHEKD HARD ENTRANCE

L.N. Korotkov, I.V. Sviridova

This article discusses the decoding algorithms with «soft» and «hard» is a system with a «hard» technique. Held the following modeling algorithms decode the transmission codeword WFP code of binary channel with additive white Gaussian noise (AWGN)

Key words: majority decoding, decoding with the introduction of erasures, Sum-Product, Min-Sum

MATHEMATICAL MODELS OF DISPERSION CHARACTERISTICS OF LEAKY WAVE STRUCTURES

S.A. Antipov, D.A. Eroshenko, A.I. Klimov

A simplified mathematical models for an approximate calculation of the dispersion characteristics of planar infinitely extended leaky wave structures with H- and E-polarization, containing a two-layer dielectric waveguide on a metal screen and one-dimensionally periodic array of metal strips. The models do not involve solving integral equations, but provide, however, an accurate calculation of the dispersion characteristics, including frequencies of the open stop-band, and can be used in the design of planar leaky wave antenna arrays of UHF and EHF bands

Key words: mathematical model, dispersion characteristic, leaky wave, metal strip grating

SETTING LDPC CODES FOR CHANNELS WITH ADDITIVE WHITE GAUSSIAN NOISE

S.A. Akulinin, I.V. Sviridova

In this article the model error-correcting coding with a low density parity check. The results obtained at various characteristics of the code generation matrix formation methods, changing the number of iterations for decoding a variable length input data

Key words: noiseless coding, the probability of decoding the parity check matrix

MILLIMETER WAVES MICROSTRIP OMNIDIRECTIONAL ANTENNA ARRAY

S.A. Antipov, A.I. Klimov, V.I. Youdin

The results of the design of a vertically polarized omnidirectional microstrip antenna for short-range millimeter wave communication systems are presented. The antenna gain is not less than 7,5 dBi, the side lobe level of the radiation pattern in the vertical plane does not exceed -19 dB

Key words: millimeter waves, microstrip antenna array, omnidirectional radiation pattern

USAGE OF PSEUDOALLOY BASED ON THE GOLD-SILICON FOR THE PROCESS OF ATTACHING A DIE OF POWER MICROWAVE TRANSISTORS

T.I. Brazhnikova, O.V. Marchenko, V.A. Kozhevnikov, A.E. Bormontov

A new method of power microwave transistors die attaching is proposed. Technical effect of the proposed method of the die attaching is provision of uniform distribution of the thermal field, reduction of thermal and electrical resistance, increase of the thermalphysic characteristics of devices and their reliability

Key words: power microwave transistor, die attach, gold-silicon

PLASMA TREATMENT INFLUENCE ON RELIABILITY OF WIRE BONDS IN GOLDEN PLATED MICROELECTRONIC DEVICES

A.A. Stoyanov, V.V. Pobedinsky, L.N. Vladimirova, N.V. Rogozin, S.I. Rembeza

It is shown plasma treatment process of golden plated integrated circuit (IC) packages in inert gas atmosphere (Ar) and its influence on reliability of wire bonds and processing surface purity

Key words: plasma treatment, metal – ceramic IC packages, surface condition analysis, reliability of wire bonds

DEVELOPMENT OF A DIRECTION-FINDING ANTENNA ARRAY LOCATED ON-BOARD OF THE UNMANNED AERIAL VEHICLE

I.S. Bobylkin, A.V. Muratov, L.A. Nosova, A.S. Samodurov

It is proposed to use an antenna array consisting of nine vertical dipoles as the mobile direction-finding. Placement of small lattice is possible on unmanned aerial vehicles. A 3D model of the device with the antenna array, the analysis of the direction-finding characteristics is presented

Key words: dipole, antenna array, unmanned aircraft