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### TRANSMISSION AND PROCESSING OF INFORMATION

<i>B.A. Alpatov, O.E. Balashov</i> ALGORITHM FOR MEASURING OBJECT VELOCITY IN AUTOMATIC TRACKING SYSTEM	
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Key words: object velocity, automatic tracking system.

The algorithm for measuring virtual (relative) velocity of objects uniformly and straightly moving in space in an automatic tracking system in the absence of information about the range is offered.

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<i>V.K. Klochko, Tr.T. Nguyen.</i> COMPARATIVE ANALYSIS OF ALGORITHMS FOR GENERATING THREE-DIMENSIONAL IMAGES OF EARTH'S SURFACE IN AIRBORNE DOPPLER RADAR	
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Key words: radiolocation, three-dimensional image, Doppler filtering, coordinate estimation, low-altitude flight.

Algorithms of three-dimensional radio images formation of terrestrial surface in on-board Doppler radiolocation based on multi-channel processing and obtaining the estimates of space coordinates of reflection elements are presented. Comparative analysis of algorithms by mathematical modeling is done. It is shown that the algorithm with the greatest accuracy is the one based on phase method of coordinates estimation ..... 11

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Key words: Stokes parameters, polarization coefficient, Muller matrix.

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<i>A.I. Bobikov, D.M. Grushin.</i> TOOLS FOR SYNTHESIS OF NONLINEAR SDRE CONTROLLER IN MATLAB (GUI)	
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Key words: nonlinear systems, SDRE controller, SDARE observer, SDRE integral control.

This article focuses on task which purpose is to develop tools for synthesis of nonlinear control systems represented by "input-state-output" model. The method based on the solution of state-dependent Riccati equation (SDRE) is applied for controller's designing. The use of SDRE controller may lead state vector and control signal to zero values. Integral control is used to solve the problem of tracking. The application allows to design control system with observer status which is based on the solution of state-depending algebraic Riccati equation (SDARE).....22

**RADIO ENGINEERING AND MEASURING SYSTEMS**

*S.N. Kirillov, P.S. Pokrovsky, A.A. Lisnichuk.* PROCEDURE OF FOUR-POSITION RADIO SIGNAL WITH SPECTRUM SPREAD SYNTHESIS

Key words: radio signal adaptation, code sequence ensemble, data communication intelligence system, multiobjective optimization.

The procedure of four-position radio signal synthesis to adapt data communication intelligence system to interference effect is proposed. This procedure is based on multiobjective optimization methods of code sequence ensemble. It is shown that the synthesized signals increase radio noise immunity by more than 4 dB (compared to QPSK signal by direct-sequence spread spectrum with MLS) with improving cross-correlation characteristic. These characteristics indirectly define sensitivity to mistakes of clock system .....29

*Yu.N. Parshin, P.A. Alexandrov.* ANALYSIS OF THE EFFICIENCY OF DETERMINING THE DIRECTION TO THE SOURCE OF RADIO SIGNAL IN FEW-ELEMENT ANTENNA ARRAY WITH OPTIMAL SPATIAL INTERFERENCE COMPENSATION

Key words: few-element antenna array, spatial compensation of interferences, maximum likelihood method.

The problem of determining the direction of the source of radio signal under the action of spatially correlated interference is being solved. The algorithms of optimal estimation of angular coordinates for deterministic signal, quasideterministic signal, random Gaussian signal are considered. The error in determining the direction of the source of radio signal is calculated based on Cramer-Rao boundaries according to the considered signal-interference situation. The influence of spatial structure of antenna array to the error in determining the direction of the source of radio emission is being researched.....34

*E.P. Vasilyev, A.G. Ivanov, M.A. Ivanov.* SWITCHED MICROWAVE FILTERS OF MODULES AIRCRAFT

Key words: dial-up filter, modeling, analysis, optimization, phase shifter.

Analysis method of switched microwave filters of beam and binary type is given. Target functions that implement partial criterion — the condition to be matched in different states (modes of operation) in operating frequency range are offered. The method was tested during the development of switched modules filters for active phased array antenna with L and S-bands in scientific production factory Radarservice.....40

*O.R. Nikitin, P.A. Polushin, D.V. Sinitsin, I. Julani.* ARITHMOLOGICAL ALGORITHM OF CONVOLUTIONAL DECODING OF DIGITAL SIGNALS UNDER INFLUENCE OF NARROWBAND INTERFERENCE

Key words: narrowband interference; interference immunity; convolutional decoding.

Algorithm of narrowband interference suppression in communication digital systems with convolutional coding is proposed. In receiver neighbour samples are subtracted and interference is suppressed. Viterbi algorithm modified by combined application of arithmetical and logical operations is used. The algorithm can increase quality of communication for more than 5 dB.....45

*A.M. Abramov, V.V. Bondartsev, S.G. Gurzhin, V.I. Zhulev, M.B. Kaplan, E.M. Proshin, A.V. Shulyakov.* VIRTUAL METROLOGICAL INSTRUMENTS TO TEST ADC MODULES FOR SYSTEMS OF ONBOARD MEASUREMENTS

Key words: automation of metrological testing, measuring virtual instruments, program modules, measurement tools, models and characteristics of analog-to-digital converters.

Modified methods and means of metrological tests of transducer system modules, onboard

measurement systems of new generation are offered. The possibilities to increase the automation of measurements in general, the accuracy of the task of test signals and estimating dynamic errors of ADC are shown.....50

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*V.P. Koryachko, A.P. Shibanov, A.N. Saprykin, O.V. Lukyanov.* FLOW PLANNING IN OPTOELECTRONIC DEVICES DATA TRANSMISSION NETWORK

Key words: opto-electronic means, two-phase routing, mutation probability, population genetic algorithm, utility function.

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*D.A. Perepelkin.* THE ALGORITHM TO FORM OPTIMAL STRUCTURES OF CORPORATE NETWORKS SEGMENTS BASED ON DATA ABOUT STRUCTURE OF CORE NETWORK AND COMMUNICATION LINKS CONNECTIVITY

Key words: corporate networks, communication links, core network, segmentation, segment, optimal structures.

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*Y.I. Menyayeva, S.P. Varseev, A.V. Yegorov.* THE USE OF WIRELESS BROADBAND ACCESS TO SOLVE THE SOCIAL PROBLEMS OF RYAZAN CITY

Key words: wireless broadband data network.

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## COMPUTER-AIDED DESIGN

*S.V. Gavrilov, G.A. Ivanova, P.S. Volobuev.* ACTUAL PROBLEMS OF LOGICAL AND LAYOUT DESIGN AUTOMATION OF STANDARD LIBRARY CELLS AND VLSI BLOCKS FOR NANOMETER TECHNOLOGY

Key words: SP-DAG, IP-block, finFET transistor, CMOS technology.

This paper is dedicated to solving the problems of custom integrated circuits design automation for perspective technologies with the feature sizes of 45, 32, 22 nm and below. The focus is on problems at the intersection of logical and topological design levels. Method has been described in this paper as providing considerable logic level interval delay analysis accuracy versus the famous approaches accounting for the simultaneous multiple input switching. We deal with specific design problems for new perspective technologies with the three-dimensional structure of the transistor gate, so called FinFET technology.....69

*A.I. Taganov, D.A. Zhukov, V.G. Psoyants.* MATHEMATICAL FORMULATION OF THE PROBLEM OF CONTROL AND REDUCTION OF SMALL SPACE VEHICLES OF CubeSat FORMAT PROJECT RISKS

Key words: space vehicle, technical condition control, mathematical model, project risk, risk reduction process.

This paper describes formulation and solving the problem of nanosatellites projects technical risks reduction and presents the context of formalized description of technical condition control process of space vehicle of CubeSat format.....77

*S.I. Perevoznikov, V.V. Kolodny, V.S. Ozeransky.* FORMATION OF DIGITAL DEVICE TRACEABLE STRUCTURES FOR SYSTEMS COMPONENTWISE DIAGNOSIS

Key words: decomposition, component, digital device, diagnostics, testing.

The peculiarities to form artificial traceable structures testable by means of entering temporal relationships between internal nodes into the scheme of digital devices (DD) are analysed. The conditions for DD scheme restructuring, which are adapted to self test process organization are studied .....83

*V.N. Ruchkin, V.A. Romanchuk, V.A. Fulin.* DESIGN OF COMPUTER SYSTEMS BASED ON NEUROPROCESSORS BASED ON FUZZY CLUSTERING

Key words: neuroprocessor systems, set-theoretic model, equivalence classes, reflexivity, transitivity, clustering, fuzzy clustering, linguistic variables.

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Key words: quadrupole mass filter, transition region, entrance aperture, resolution, efficiency of mass analyzer.

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*A.N. Schesterkin.* DETERMINATION OF PLASMA DISPLAY PANEL IGNITED CELLS AVERAGE NUMBER

Key words: plasma display panel, cell of PDP, average number of ignited elements, probability of ignition, simulation.

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*N.A. Zelentsov, M.U. Prosekin, I.G. Prosekina, V.V. Shirokov. A.D. Levchenko* CARBON NANOSTRUCTURES VERIFICATION PERFORMED BY CATALYTIC PYROLYSIS WITH THE HELP OF RAMAN SCATTERING COMBINED WITH SCANNING PROBE MICROSCOPY

Key words: nanostructures, nanotubes, fullerenes, Raman scattering, scanning probe microscopy.

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## MANAGEMENT IN SOCIAL AND ECONOMIC SYSTEMS

*L.A. Demidova, Ya.S. Sokolova.* LINGUISTIC APPROACH TO THE PROBLEM OF COMPETITIVE PROJECTS CLASSIFICATION BY MEANS OF MULTISSET THEORY TOOLS

Key words: competitive project, expert estimation, classification, strategy, linguistic variable, multiset.

The development problem of generalizing decisive rules of competitive projects, arising in the conditions of inexact expert knowledge about estimates of competitive projects according to estimation characteristics and characteristics importance is considered. The approach to competitive projects estimation realizing representation of inexact expert knowledge on the base of linguistic variables and allowing to consider various strategies of forming generalizing decisive rules classification by means of multiset theory tools is offered..... 109

*O.A. Kozelkov.* METHODOLOGY OF SYSTEM ANALYSIS AND ESTIMATION OF ENTERPRISE DEVELOPMENT PLANS REALIZABILITY

Key words: system analysis, methodology, estimation of realizability, enterprise innovative development.

Formal-logical description and hierarchical presentation of enterprise functions that allowed to work out corresponding structure of its development realizability indexes are offered. For the estimation of these indexes the methodology is offered, the basic principles of which are reflected in 3D models of enterprise. Methodology is based on functional approach and categories of qualimetry, allows to get local and integral estimations of realizability taking into account the real possibilities of enterprise functioning, that promotes authenticity of decisions in investment planning ..... 117

*I.V. Konstantinova, G.M. Chukalina.* CUSTOMER VALUE AS A CRITERION FOR RESTRUCTURING OF BUSINESS PROCESSES

Key words: business process, customer business process, types of business process results consumers, customer value, restructuring (reengineering) of business processes.

For the decision to conduct reengineering the company proposed to use a value approach. A special feature is the use of the criterion value created for the customers on the basis of business processes results. In this system, users are presented with both internal and external customers. Evaluation of the resulting value becomes the criterion for making a decision on restructuring (reengineering) business processes ..... 123

*V.A. Tsvetkov, E.L. Loginov, D.N. Efremov.* PROCESS MANAGEMENT SUPPORT OF FUNCTIONAL COMPETENCIES AND MANAGERIAL PERSONNEL IN THE BODIES OF STATE ADMINISTRATION, KNOWLEDGE-INTENSIVE INDUSTRIES AND REGIONAL SECTORS OF RUSSIAN ECONOMY

Key words: economy, infrastructure, science, education, manufacturing, network integration.

This article discusses the support of functional competencies and managerial personnel in state agencies and knowledge-intensive industries by forming a distributed educational, scientific and

industrial network organization of interaction processes of public authorities and businesses using various forms of public-private partnerships ..... 127

## BRIEF REPORTS

*A.A. Panchenko.* EVALUATION OF SIGNAL DETECTION WITH SOFTWARE-DEFINED RADIO USING TV TUNER BASED ON RTL2832U CHIP

Key words: software-defined radio, SDR, TV tuner, RTL2832U, signal detection, signals intelligence.

Based on open sources of information and individual enthusiasts investigations of sampling features and digitizing possibilities of TV tuner based on RTL2832U chip for creating software-defined radio (SDR) were estimated. With TV tuner connected to MatLab and Simulink in 64-bit Linux operating system the real-time characteristics of RTL2832U and R820T chips were measured and evaluated. Software components for building desktop and mobile SDR for radio signal detection are offered. .... 132

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Key words: cloud technologies, distributed information systems, requests management, BigData, cloud database.

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Key words: VLF radio noise, distribution function, average duration, Hall model.

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