

## **CONTENTS AND ABSTRACTS**

### **DATA TRANSMISSION AND PROCESSING**

*S.N. Kirillov, V.A. Revutsky.* THE ALGORITHM OF CONVOLUTIONAL ERROR-CORRECTION CODES DETECTING AGAINST RANDOM BINARY SEQUENCE

Key words: error-correction code, convolutional code, analyzed binary sequence, satellite communication system, code constraint length.

The algorithm of basic convolutional error-correcting codes detection used in satellite communications systems against random binary sequence is proved. It is shown that the proposed algorithm provides correct detection of error-correcting codes considered with probability not less than 0.94 and false alarm probability not more than 0.08 at values of bit error probability in binary sequence not more than 0.1 .....3

*M.V. Ilyushin, K.S. Bespalov, A.P. Bocharnikov.* WIDEBAND SPEECH SIGNAL CODING WITH ADAPTATION TO PSYCHOACOUSTIC SPECIFIC OF SYNTHESIZED SPEECH PERCEPTION

Key words: quality of speech transmissions, low-speed speech coding, wideband speech signal, adaptive system, psychoacoustic model.

Algorithm of wideband speech signal coding taking in account existing requirements of mobile radio communication system subscribers to synthesized speech naturalness and its recognizability is suggested. Reasonability of psychoacoustics feature usage in the terms of low-speed wideband speech signal coding is proved by the results of experimental research.....8

*V.T. Dmitriev, D.I. Lukyanov.* MASKING ALGORITHM BASED ON KHURGIN-YAKOVLEV DEMISE USING SECOND AND THIRD ORDER DERIVATIVES

Key words: Khurgin - Yakovlev algorithm, masking, signal derivative, synthesis filter, falsification of phonograms.

The application of speech signal processing algorithm based on Khurgin-Yakovlev demise using second and third order derivatives in masking systems. For given algorithm a synthesis filter calculation required for signal recovery, the analysis of derivatives accuracy as well as the quality of the reconstructed signal is made. It is shown that the algorithm based on Khurgin - Yakovlev idea provides quality signal reconstruction using first and second order derivatives as well as the increase in minimum computational complexity of masking algorithm..... 13

### **RADIOTECHNICAL AND MEASURING SYSTEMS**

*V.G. Andreyev, V.A. Belokurov, V.I. Koshelev.* COHERENT-NONCOHERENT ACCUMULATION OF WEAK RADIOSIGNALS

Key words: threshold signal, elimination of distance uncertainty, increasing radar range, signal accumulation.

We synthesized a two-stage sequential coherent-noncoherent algorithm for detecting a small target with simultaneous elimination of uncertainty with respect to both distance and velocity. We show that threshold signal-to-noise ratio for the synthesized procedure is a mere 0.5 dB higher than for optimal detection system. Resulting algorithm may be realized in real time ..... 18

*I.E. Syrmolotnov, O.A. Karacheva.* SENSOR RESEARCH TO MEASURE DEFLECTED MODE OF DISK AND TENSOSENSITIVITY OF SAW STRUCTURES.

**Key words:** SAW-based pressure (force) gauge, disk strain gauge, mechanical stress, oscillator frequency, ST - cut of quartz.

The way to calculate the deflected mode of a disk in the field of interdigital transducer of surface acoustic waves (SAW) arrangement when compressed by two equal diametrical forces is offered. Expressions for normal and shear mechanical strain, settlement loading scheme disk strain gauge with interdigital transducer of SAW, a graph to distribute mechanical stress in a disk at compression along diameter and findings of experimental investigations of SAW delay lines tensosensitivity are resulted .....21

## COMPUTER SCIENCE AND APPLIED MATHEMATICS

*V.N. Loktiukhin, A.V. Antonenko, S.V. Chelebaev.* METHODOLOGY OF NEURONS-CONVERTERS FUNCTIONAL MODELS BUILDING

**Key words:** artificial neural networks, information form converters, neurons-converters, functional models, neural basis of operations.

Article considers main approaches and techniques combined in the methodology to construct functional models of neurons-converters as important elements in the description of ANN-converters. Examples to develop «code – frequency» and «frequency – code» neuron-converter functional models are given.....26

*D.A. Perepelkin.* ADAPTIVE ACCELERATED ROUTING ALGORITHM BASED ON IGRP PROTOCOL IN THE COURSE OF DYNAMIC CORPORATE NETWORK NODES AND COMMUNICATION LINKS FAILURE

**Key words:** adaptive accelerated routing, IGRP protocol, dynamic changes, routing algorithms, corporate networks.

Adaptive accelerated routing algorithm based on IGRP protocol during dynamic corporate network nodes and communication links failure which increases the quality of its operation is offered.....33

*A.I. Gulin, Zh.A. Sukhinets.* RESEARCH OF SENSITIVITY AND LOAD RESISTANCE IMPACT ON OUTLET CHARACTERISTICS OF CONVERTERS AND CHAIN-TRIPOLAR STRUCTURE DEVICES WITH THE USAGE OF FUNCTION CONVERSION METHOD

**Key words:** conversion function, chain-structure, frequency, load resistance, sensitivity.

In this paper applying conversion functions method an impact of elements parameters changes as digital-to-analog converters output voltage sensitivity and quasi-resonance frequency of phasing RC-oscillators chains is investigated. The analytical expressions are being obtained and the dependences of output oscillator frequency on the change of load resistance value are being built .....39

## ELECTRONICS

*V.A. Korotchenko, V.I. Solovyev, Zh.V. Solotenkova.* NUMERICAL MODELING OF REED SWITCH CLOSING PROCESS

**Key words:** closing of magnetically operated contacts, magnetic resistance, movement of contact parts, current of operating coil.

A computer model of reed switch closing process in a chain with active loading is developed. The model was tested in application to MKA-14108 reed switch for current of 0.1 A and voltage of 100 V. Time dependence of contact details coordinates, magnetic, elastic and electric forces influencing the detail, and parameters of magnetic and electric circuits are obtained. It was established that a relatively large (about 10  $\mu$ J) energy with bounce details to the positive

electrode due to pulse field emission current is allocated. This may be the reason for contacts erosion. Reliability of simulation results is confirmed by experiment..... 44

*N.N. Bisyarin.* DISTRIBUTION OF FIELD IN ION SHUTTERS OF ION MOBILITY SPECTROMETER

Key words: ion mobility spectrometer, ion shutter, field configuration.

The paper presents the results of computer simulation of field configuration in a measuring cell ion mobility spectrometer with three types of ion shutters. The effect of drift electrode and ion shutter diameter on electric field distribution is investigated. The features of design influence on analytical characteristics of the device are revealed ..... 50

*A.A. Trubitsyn, A.B. Tolstoguzov, A.O. Saulebekov, D.V. Suvorov, D.Yu. Tarabrin, Zh.T. Kambarova, P.I. Kuksa.* LONG-FOCUS AUGER MICROPROBE DESIGN

Key words: electron and ion optics, energy analyzer, electron gun, Auger spectrometer.

Long-focus Auger microprobe design consisting of energy analyzer with built-in electronic gun for local analysis of solid surface is represented. The distance from the analyzer with outer diameter of 80 mm to a researched sample makes 20 mm. Relative energetic resolution of the analyzer allows regulation within 0.2-1.3 % in case of input solid angle of 6 % from  $2\pi$ . The gun provides diameter of a focal spot about 1 micron in case of a current about 100 nA ..... 54

## MANAGEMENT

*S.A. Sokolov, A.K. Musolin.* ALGORITHMS OF PROCESSES TO CHECK, CONTROL AND MONITOR THE SYSTEMS OF CRITICALLY IMPORTANT OBJECTS

Key words: crucial objects, algorithms of monitoring systems, formation of administrative decisions.

The article considers the problems to model the algorithms of processes to check, control and monitor complex systems of critically important objects. The authors offer the mechanism of preparation, elaboration and forming of managerial resolutions, as well as the composition of system sections to support the development of managerial decisions ..... 60

## BRIEF REPORTS

*O.N. Kryutchenko, A.F. Mannanov.* DEGRADATION OF HELIUM-NEON LASERS COLD CATHODES SURFACE

Key words: oxide covering, cold cathode, helium-neon laser, pass-through time.

Complex researches of dynamics to vary the surface of helium-neon lasers cold cathodes during their operation are executed..... 67

*A.A. Bogdanov, V.K. Klochko, A.B. Feldman.* RESEARCH OF THREE-DIMENSIONAL IMAGES FORMATION ALGORITHM ON THE BASIS OF ONBOARD OPTOELECTRONIC SYSTEM OF SUPERVISION

Key words: optoelectronic systems, three-dimensional images.

Influence of conditions of supervision and noise level on accuracy of three-dimensional images formation algorithm work in onboard optoelectronic system of supervision is investigated ..... 70

*I.S. Kholopov.* SOFTWARE SIMULATOR OF DIGITAL THREE AXIS ORIENTATION SENSORS SIGNALS

Key words: MEMS gyroscope and accelerometer, magnetometer, Euler-Krylov angles, affine transformations, quaternion.

The implementation of three-axis sensor (a magnetometer, MEMS gyro and MEMS accelerometer) signals software simulator with digital interface is considered. Mathematical models of these sensor signals are developed. The comparison of software simulator diagrams and MEMS sensor signals records as it rotates in three dimensions show the adequacy of developed mathematical models.....73

*I.E. Sinitsyn, A.N. Varnavsky, E.S. Korochkin.* INFLUENCE OF STRUCTURAL FEATURES OF SOME TYPES OF ELECTRIC MOTORS FOR USE IN ELECTRIC MOTORS ADAPTED FOR USE CONSIDERING OPERATOR CONDITION

Key words: electric, electric motor, motor-power, torque and safety.

The impact of design features of some types of electric motors for use in electric motors adapted to work in the condition of operator is examined. Usefulness of constructive governmental modifications of motor and the possibility to use motor-amplifier is proved .....76

INFORMATION ABOUT THE AUTHORS (Russian) .....80

INFORMATION ABOUT THE AUTHORS (English).....82