CONTENTS AND ABSTRACTS

RADIO ENGINEERING AND COMMUNICATION SYSTEMS

YU. N. PARSHIN, Q. V. BUI. ADAPTIVE ALGORITHMS FOR SIGNAL PROCESSING WITH SEPARATION INTO SPATIAL AND TEMPORAL COMPONENTS AGAINST THE BACKGROUND OF BROADBAND AND NARROWBAND INTERFERENCE COMPLEX

Keywords: adaptive algorithm, spatial component, temporal component, interference complex, broadband interference, narrowband interference.

In this paper, adaptive algorithms for processing antenna array signals in a complex of broadband and narrowband interference are investigated. A comparison of various adaptive signal processing algorithms in the presence of interference set and their effect on noise immunity is made. To reduce computational costs, the options of adaptive signal processing algorithms with separation of processing into spatial and temporal components are proposed. The asymptotic convergence of adaptive algorithms to optimal signal processing algorithms with separation into spatial and temporal components has been established.

A. A. LISNICHUK, P. S. MESHCHANINOV. ALGORITHM FOR MULTI-CRITERIA SELECTION OF MODULATION TYPE FOR ADAPTING RADIO COMMUNICATION SYSTEMS TO STRUCTURAL INTERFERENCE

Keywords: adaptive modulation, noise immunity, structural interference, PAPR, multi-criteria approach.

Due to the intensive use of time resources by radio communication systems (RCS), structural interference is becoming more common. In addition, it is necessary to transmit more data and increase the speed in radio channel without loss of quality. Adaptive variation of modulation type allows you to change the radio signal depending on transmission conditions, providing the balance between interference resistance and spectral efficiency. However, as a rule, this method uses only one criterion, without taking into account other important characteristics of RCS such as signal peak factor. The aim of the work is to develop an algorithm for multi-criteria selection of modulation type to adapt RCS to the effect of structural interference. Multi-criteria approach allows taking into account several quality criteria: resistance to AWGN and structural interference, energy efficiency of generated signal, as well as spectral efficiency. The use of the developed algorithm implements a gain in spectral efficiency of 1.5-2 times compared with static modulation RCS, and a gain in peak factor of 1.2-1.6 times compared with an adaptive system based on a variation in modulation type only in the class of QAM signals.

V. T. DMITRIEV, VU HOANG SON. DEVELOPMENT OF MULTICHANNEL SYSTEM BASED ON THE MODIFICATION OF THE KHURGIN – YAKOVLEV ALGORITHM USING SIGNAL SAMPLES AND ITS FIRST THREE DERIVATIVES

Keywords: modification of the Khurgin – Yakovlev algorithm, sampling theorem, speech signal processing, primary codecs, communication channels, filters, objective speech quality, ViSQOL.

A modification of the Khurgin – Yakovlev algorithm for four-channel implementation, based on speech signal representation in the form of downsampled samples of a signal

and its first three orders of derivatives is proposed and investigated. The possibilities of parallel processing of signal samples are demonstrated, and an evaluation of system error resilience created on the basis of the proposed algorithm is performed. A comparison of error resilience of the transmission system based on the modification of the Khurgin-Yakolev algorithm using signal samples and its first three orders of derivatives with a system built on the basis of Kotelnikov's theorem is carried out. Experimental studies of primary speech signal coding algorithms based on the proposed algorithm with different numbers of channels are conducted. Compared to the systems based on Kotelnikov's theorem, the authors show that the gain in restored speech signal quality in the presence of noise in transmission channel with bit error probability from 0,1 to 5 % amounts from 0,2 to 1,4 points according to Mean Opinion Score (MOS) scale for low-rate coding algorithms, from 0,2 to 1,8 points for medium-rate codecs, and up to 1,6 points for high-rate coding algorithms.

INTELLIGENT INFORMATION SYSTEMS
AND TECHNOLOGIES

I. YU. KASHIRIN. EXTRACTING FACTS FROM NATURAL LANGUAGE TEXTS BY METHOD OF UNIFICATION OF SEMANTIC PATTERN

Keywords: Bert models, fact extraction, semantic patterns, retrievers, political news, natural language analysis, deep learning models.

The original technology of designing and applying semantic patterns for processing natural language constructions is considered. The method of semantic patterns unification, called i-patterns, is described constructively. The technology uses tuples of words formed from various knowledge base relationships and is used to extract concise facts from complex sentences of mass media. An end-to-end example of software implementation in Python v.3.10 and Anaconda v.2.1 environments is considered.

Software implementation of the technology uses external software libraries SpaCy, WordNet, Ru-WordNet, Wiki-ru-WordNet, FrameNet, stanza, Yargy, as well as search retriever, Python i-patterns with an original unification algorithm developed by the author of the article. The effectiveness of the technology presented is confirmed by a series of practical experiments using the example of solving the problem of accumulating a training corpus for language neural network BERT models. The results of the study will be useful in classifying media materials into reliable and false ones.

The aim of the work as a scientific article is to present a new intelligent method of unifying se-mantic patterns to extract concise facts from complex political articles to the experts in AI field.

V. P. KORYACHKO, S. D. VIKULIN, A. V. VOLKOV. COMPARATIVE STUDY OF MACHINE LEARNING METHODS AND NEURAL NETWORKS FOR PREDICTING CHEMICAL COMPOSITION OF MATERIALS

Keywords: machine learning, multi-class regression, chemical composition, physical properties of materials, neural networks, linear regression, decision trees, material science.

The problem of developing methods for predicting the chemical composition of materials based on their physical properties using machine learning approaches is considered.

The aim of this work is to study the relationships between physical and chemical properties of materials to develop an intelligent system in order to support new materials design. Machine learning algorithms such as linear regression, decision trees, and neural networks to predict the chemical composition of different materials were employed. The study highlights the effectiveness of the proposed methods for accurately predicting the chemical composition, which can optimize material development process and improve material properties.

A. V. KROSHILIN, S. V. KROSHILINA, G. V. OVECHKIN, O. D. SAMORUKOVA. MODELING OF MANAGEMENT PROCESSES IN ORGANIZATIONAL SYSTEMS BASED ON FUZZY COGNITIVE MAPS THEORY

The analysis of enterprise activities in modern market conditions is the scientific basis for substantiating managerial decision-making in business processes. At the same time, the problem of automating the analysis of enterprise activities, which allows accurate assessing the uncertainty of the situation using modern research methods becomes relevant. The solution to this problem can be found in the development of a methodology to design decision support systems for analyzing organizational system functioning.

The aim of the work is to consider the features of developing fuzzy cognitive maps to model management processes in organizational systems. The authors propose an approach to construct universal mental map that allows simultaneous accounting the influence of changes values in concepts and the values of their states, while taking into account the nonlinear nature of the influence of changes in concepts, as well as simultaneous accounting of concepts of different signs on each other, which makes it possible to significantly reduce the dimension of management model.

A dynamic management model has been developed for a fuzzy cognitive map, which allows modeling and analyzing the behavior of organizational systems describing various subject areas, taking into account the nonlinear nature of the influence between concepts.

A. N. PYLKIN, V. V. TISHKINA. INFORMATION SYSTEM FOR THE FORMATION OF MANAGEMENT DECISIONS TO IMPROVE THE CURRENT SITUATION OF THE MANAGEMENT OBJECT

The article considers the object of management as a middle-class enterprise, also describing which enterprise can be classified as such. The complexity of managerial decision-making in such an enterprise is due to many factors, among which the incompleteness and uncertainty of initial data play a key role. In constantly changing external environment and rapidly changing internal processes of an enterprise, managers are faced with the need to process and analyze a large amount of information, which is not always accurate or complete. To transform the information characterizing an enterprise into a form suitable for analysis and management decision-making, several steps need to be

performed: data collection, purification, integration, data analysis and visualization, interpretation of results, decision-making, monitoring and evaluation of data. Converting information about an enterprise into a form suitable for analysis requires time and resources, but it is an investment in the future development of the organization. Data analysis allows you to make informed management decisions that contribute to the development of the enterprise and increase its competitiveness. The aim of the work is to develop an information system for analyzing, interpreting and converting statistical information and information from external channels accumulated at the enterprise into recommendations of management decisions aimed at improving current situation at the enterprise. Information system also needs tools to help experts of the enterprise and management of the organization customize the system for themselves, taking into account specific features of the organization: industry, form of management, type of organization, profit margin, number of employees, etc. Using fuzzy logic methods, semantic networks and expert assessment methods, it is possible to generate recommendations for improving current situation at management facility. The result of the research is the development of a structural scheme of information system and a software module for the formation of management decisions. The module allows you to automate the process of data analysis and generation of recommendations for improving the condition of the enterprise. This, in turn, contributes to improving the efficiency of management, the quality of decisions made, improving the overall condition of the enterprise and, as a result, increasing company's revenues. In the future, the information system may be adapted for large or small enterprises, despite the fact that it was designed for medium-sized enterprises.

O. A. POPOVA. DEVELOPMENT OF HYBRID FACTOR ANALYSIS METHOD FOR SMALL MEDICAL DATA SET

Keywords: medical data, factor analysis methods, PLS, FastICA, BFA, MLFA, hybrid methods of factor analysis, Random Forest, Neural Networks, coefficient of determination, information criteria, preprocessing of input data.

The paper presents a comparative analysis of the effectiveness of well-known methods of factor analysis: PLS, FastICA, BFA and MLFA, as well as newly developed hybrid methods PLS-NN and PLS-RF. The main aim of the study was to identify methods that provide the best accuracy in explaining the variance in target variable and the best fit of the model to data. The results showed that PLS method explained a significant proportion of the variance in target variable, demonstrating good model fit, but there were signs of excessive model complexity. FastICA method demonstrated high explanatory power, but potential overfitting problems were identified. BFA and MLFA methods showed unsatisfactory results, characterized by negative predictive performance and unsatisfactory values of model fit indicators. Based on the results of the study, PLS method was chosen for further improvement and adjustment. In order to increase its efficiency, hybridization was used, which significantly improved the quality of the model and its fit to the data. The analysis of the results of hybrid factor analysis methods (PLS-NN and PLS-RF) showed that both methods have high ability to explain variation in source data. However, PLS-NN method outperformed PLS-RF method in a number of indicators, such as the coefficient of determination, information criteria AIC and BIC, as well as RMSEA and SRMR indicators, which indicates a better fit of the model to data and a lower level of approximation error. In summary, the study confirms that PLS-NN is the method of choice to be used in considered dataset due to its accuracy, explanatory power and model fit quality. The problem of finding the characteristics of data channel of air-

craft opto-electronic trajectory measurements is studied. The aim is to find main channel quality indicators in a stationary mode with the transmission of priority and non-priority data opto-electronic means of trajectory measurements at different values of input stream intensity, window length and probability of frame distortion during transmission. Input stream from each measuring station is simple with a given priority level. Frame transmission through the channel is based on window control. Channel quality indicators using queuing system M/G/1 are found. The degree of frame error probability influence in case of transmission protocol window length while trans-mitting via communication channel on mediate values of frame number in a system, the time of frame waiting in a queue, determined for priority and non-priority frames is evaluated.

MATHEMATICAL AND COMPUTER MODELING

K. A. MAIKOV, A. N. PYLKIN, S. N. KUZMENKO, A. A. TEPLOV. CALCULATION OF MULTIFRACTALS BY GROWTH METHOD IN VIRTUAL AND AUGMENTED REALITIES

Keywords: virtual and augmented reality, numerical modeling, multifractals, multifractal spectrum, growth law of multifractals, algorithms for constructing multifractals.

A method for modeling multifractals by growth method on stationary and growing geometric media is proposed. The problem of controlling multifractal spectra and the processes of growth of multifractals over time is solved. The concept of multiparametric or vector multifractals is proposed, which makes it possible to describe non-trivial multifractal complexes. Algorithms for calculating multifractal structure on growing monofractal and calculating point multifractals have been developed. The analysis of machine experiments results confirmed practical applicability of the proposed algorithms.

V. A. BOCHAROV. FUNCTIONAL-ROLE MODELING ON THE EXAMPLE OF MANNED AIRCRAFT DISPLAY SYSTEM

Keywords: functional-role specification, functional logic, function, role, phase, mode, semantics, indication sys-tem.

The article demonstrates an example of solving the problem of formally defining the functionality of cyber-physical systems using the advantages of the functional-role specification (FRS), allowing to define the system directly in terms of its consumer properties, concept and functionality, using a universal natural-algorithmic language. The example illustrates the key patterns that the process of equivalent functional decomposition obeys – the derivability of values from arguments, the presence of a predicate in control that «knows» inputs and outputs, and the inclusion of a subset of ports before decomposition in a set of ports after it. Identification and implementation of these patterns makes it possible to automate design at functional level.

A. G. VOLOSHKO, A. N. IVUTIN, O. S. KRYUKOV. APPROACH TO OPTIMIZATION OF MANUFACTURING PROCESSES USING MATHEMATICAL APPARATUS OF ADVANCED PETRI NETS

Keywords: optimization, constraints, informational systems, manufacturing process, Petri nets, simulation.

Modern manufacturing faces efficiency challenges. At the same time, efficiency can often be in-creased through competent organization of processes, taking into account the

use of hidden parallelism of individual stages and the possibility of additional automation of information exchange processes. Thus, the aim is to describe an approach to the analysis and optimization of production processes based on the criterion of execution time. The article proposes the use of extended Petri nets with se-mantic relations, which make it possible to separate the flows of actual execution of operations, i.e., the specific implementation of the process, and the flow of requirements for performing operations from the viewpoint of performing preparatory stages. This paper describes the structure of corresponding software for analyzing and issuing recommendations to modify the process and examines in more detail the approach to process optimization implemented in the corresponding module of the system, which allows, based on network structure analysis, to determine bottlenecks and offer, taking into account specified restrictions, the options for modernization.

S. S. RUMYANCEV. MATHEMATICAL MODELING IN DESIGNING REFLECTOMETRIC LEVEL GAUGE FOR MEASURING WATER LEVEL IN NUCLEAR POWER PLANT CIRCUIT

Keywords: reflectometric level meter, pulse reflectometer, mathematical model, nuclear power plant, computer model, SimInTech.

The article builds a mathematical model of pulse reflectometric level meter designed to measure the coolant level in the first circuit of a nuclear power plant, taking into account the heterogeneity in microwave path. The resulting model is implemented programmatically in SimInTech dynamic modeling environment as a block diagram consisting of submodels. The results of studies of a pulse reflectometric level meter based on a computer model created in SimInTech are obtained.

SYSTEM ANALYSIS, MANAGEMENT
AND INFORMATION PROCESSING

O. A. PRESNYAKOV. THREE-CYCLE SURFACE EDGES ANALYSIS ALGORITHM FOR OCCLUSIONS DETECTION DURING ORTHORECTIFICATION

Keywords: occlusion, orthorectification, backward projection, DSM, intersection of ray and surface, ray tracing, iteration over surface edges, piecewise-linear DSM interpolation, true orthophoto.

The aim of the work is to create an algorithm for occlusion detection during orthorectification of satellite images using backward projection. Occlusions are the areas of an orthoimage that are obscured by towering objects. Processing using indirect method leads to incorrect filling of occlusion areas by repeated fragments of an image. According to the developed algorithm, a pixel belongs to obscured if a viewing vector above it intersects with piecewise-linear surface that interpolates digital surface model (DSM). The algorithm includes three cycles of iterating over the edges of this surface. The first cycle processes edges, which projections in DSM coordinate system are located vertically, the second – horizontally, and the third – diagonally. The coordinates of intersection points of a viewing vector and edges projections in each cycle form an arithmetic progression and are calculated as quickly as possible. The algorithm provides reliable detection of occlusions without omissions and false identifications.

A. V. MINGALEV. METHOD AND ALGORITHMS OF PROCESSING SCANNER THERMAL IMAGES BASED ON HIGH-ACCURACY NEURAL NETWORKS FOR AUTOMATIC DETECTION OF SPECIFIED TYPES OF OBJECTS

Keywords: neural network algorithms, semantic segmentation, machine learning, scanner thermal imaging systems.

This paper presents the results of research conducted to develop a numerical method and processing algorithms for scanner thermal images based on high-accuracy neural networks for automatic detection of objects in thermal images. The aim was to ensure the possibility of decoding graphic data generated by scanner thermal imaging systems in real time. The main criteria of evaluating the algorithms under research were data processing speed and decoding accuracy. The criteria were assessed on the basis of practical experiments involving training and running neural network algorithms using the developed software on a computer. A numerical method of processing scanner thermal images based on high-accuracy neural networks for automatic detection of specified types of objects in thermal images has been developed that is different from the known method by a smaller number of neural network model parameters with higher accuracy-to-decoding time ratio. This allows for automatic detection of specified types of objects in scanner thermal images in real time as part of various software and hardware systems for automated decoding of graphic information.

A. I. NOVIKOV. EXPERIENCE IN APPLYING MATHEMATICAL METHODS IN DIGITAL SIGNAL PROCESSING

Keywords: mathematical methods, linear and nonlinear operators, affine and projective transformations, interpretation of indirect measurements, complex contour analysis.

The application of mathematical methods in solving digital image processing problems and certain issues of processing one-dimensional digital signals are considered. It is impossible to review the entire range of mathematical methods used in digital signal processing in one article. Moreover, the author considers it appropriate to talk only about those methods that were developed and applied by him and his students in works performed mainly on an initiative basis. Therefore, only four groups of methods are considered. The aim of the work is to introduce novice researchers to the possibilities provided by mathematical methods to solve both applied problems and fundamental problems in digital signal processing.

K. V. BUKHENSKY, V. V. MIRONOV. DEVELOPMENT OF A NEW DIRECTION BY RYAZAN MATHEMATICIANS – CONTROL «IN THE SMALL

Keywords: control theory, new direction of the theory – control «in small», history and development of a new theory, theory application.

The history of creating a new direction in mathematical theory of control – control «in small», discovered and currently developed by scientists of Ryazan State Radio Engineering University named after V.F. Utkin, is systematically revealed. General control theory is considered as one of the main sections of the theory of optimal control. The main results of the theory of global control, local control and control «in small» and the names of their authors are presented. The aim of the study is to familiarize Russian sci-

entific community, specialists in control theory with a new direction - control «in small». The history of formation and development of the theory, as well as applied problems are presented.

M. Y. ZVYOZDOCHKIN, A. A. KAMORDIN, N. M. SAFRONOV. FAST METHOD OF CORRUPTED VIDEOFRAMES RESTORE USING MOTION JPEG INFORMATION REDUNDANCY

The subject of this article is videoframes restore in onboard video monitoring systems in case when videoframes are corrupted during transmission over radio channel. The aim is to develop and verify fast algorithms for videoframes restore; these algorithms must be applicable in quazi realtime mode. Typical Motion JPEG-specific defects of corrupted frames are described. Defects detection methods based on interframe and interline analysis are proposed. For these frames, some low-cost correction method are proposed. Methods restrictions are considered.

A. K. LINKOV. PROCESSING OF ADJACENT STEREO FRAMES USING MULTI-CORE COMPUTING SYSTEMS

This paper presents the process of adjacent stereo frames analysis, specifically the method of their pre-processing, as well as an algorithm for matching image fragments (local features) and generating a depth map. The structure of the algorithm, which consists of nested loops, is shown. This implies the possibility of executing such algorithms on various multi-core computing systems, using parallel computing techniques. These techniques would significantly improve processing performance, bringing it closer to real time scale. The existing classes of multi-core computing systems are analyzed. Their features and applicability to the task of stereo frame processing are reviewed.
Experimental studies were carried out using the developed program in Python language and auxiliary libraries. The execution time of the algorithm was measured in single-threaded mode, using software optimization, and on a massively parallel device – graphics processor.
The aim of the work is a comparative analysis of different types of computing systems, as well as demonstration of optimization possibilities for nested loops.

S. V. SKVORTSOV, V. I. KHRYUKIN, T. S. SKVORTSOVA. PARAMETRIC SYNTHESIS OF A DIGITAL PID CONTROLLER BASED ON ANALYTICAL AND GRAPHICAL MODEL OF CONTROL SYSTEM

The problem of determining parameters numerical values of the algorithm for the functioning of digital microcontroller implementing proportional-integral-differential con-

trol law is considered. The aim of the work is to obtain calculation formulas and methods for parametric synthesis of a control algorithm that ensures the fulfillment of specified requirements for accuracy, speed and quality of control process. To solve this problem, in addition to analytical description of control system, a graphical method is used to construct the desired logarithmic amplitude-frequency response. The analytical and graphical model used is adapted to the features of discrete representation of signals and the functioning of digital control system elements. The experimental part of the work shows an example of calculating the parameters of digital microcontroller control algorithm.

R. V. KHRUNICHEV. ANALYTICAL STUDIES OF USE RESULTS DISTRIBUTION USING THE EXAMPLE OF RYAZAN REGION

Keywords: USE results analysis, statistical analysis, sample analysis, selection characteristics, normal distribution, statistical hypothesis verification, large-volume USE samples, USE results data.

The statistical and analytical analysis of large-volume samples with the results of unified state exam (USE) of school graduates of Ryazan region in the period from 2019 to 2024 in key general education subjects for engineering education – mathematics, physics, computer science, as well as Russian as a compulsory subject for all graduates of grades 11 is carried out. The aim of the work is to confirm or refute the hypothesis of normal distribution of USE results for individual subjects over the specified period, to establish the presence of systematic trends in USE results distribution. Using pre-selected method, the authors are aimed to determine the main characteristics – mathematical expectation and average square deviation of a random variable, necessary to test the hypothesis about the nature of USE results distribution.

R. V. KHRUNICHEV. STATISTICAL ANALYSIS OF THE RESULTS OF THE UNIFIED STATE EXAM OF UNIVERSITY APPLICANTS ON THE EXAMPLE OF THE RYAZAN REGION

Keywords: USE results analysis, sample analysis, quality of mathematical and natural science education, statistical analysis, sample characteristics, experimental results processing, engineering education.

The analysis of large-volume samples with statistical data on the results of Unified State Exam of applicants enrolled in general education subjects: mathematics (profile), Russian language, physics, social studies, computer science, chemistry, obtained during the admission campaigns from 2019 to 2024 is given. The aim of the work is to obtain sample characteristics and moments when processing data on the results of Unified State Exam of 11th grade graduates, analyze the results obtained to identify systematic trends and deviations in the results; to assess the level of preparation of applicants for university studies. The results of Unified State Exam equal to and above the minimally defined thresholds required by the Ministry of Education and Science of the Russian Federation for participation in the course were taken as initial data. The results of Unified State Exam of applicants who entered general competition were analyzed in subjects that are key to obtaining engineering education – mathematics, physics, and computer science.

INFORMATION AND MEASURING SYSTEMS

A. M. ABRAMOV. INFLUENCE OF NON-STATIONARY EFFECTS OF TEST ENVIRONMENT ON THE ACCURACY OF RELATED HISTOGRAM METHOD FOR ADC METROLOGICAL TESTS

Keywords: non-stationary effects, metrological test system, analog-to-digital converter, measuring signal, integral non-linearity, estimation error, histogram, code transition time, digital-to-analog converter.

The problem of determining the requirements to metrological test system hardware by method of coupled histograms to ensure the accuracy of measuring integral nonlinearity (INL) of ADC at the level of 1LSB (least significant bit) is considered. The aim of the paper is to evaluate the accuracy of coupled histogram method under non-stationary effects of test environment. Dependences for method of coupled histograms are found, showing that the error in determining INL of ADC when measuring signal (MS) is shifted up or down is determined by the ratio of maximum drift of MS reference level to the product of MS offset voltage by nominal quantization interval of ADC. The method of reducing the influence of non-stationary effects of test environment on the accuracy of coupled histograms method is proposed, which consists in combining INL functions obtained by shifting reference level of original MS downward and upward, and averaging their common part.

PHYSICAL ELECTRONICS AND NANOELECTRONICS

V. S. KHILOV, V. V. TREGULOV, A. I. IVANOV, N. V. RYBINA, N B. RYBIN. ELECTRO-PHYSICAL PROPERTIES OF SEMICONDUCTOR STRUCTURE WITH POROUS SILICON FILM IRRADIATED WITH NANOSECOND YTTERBIUM LASER

Keywords: porous silicon, nanosecond laser pulses, current-voltage characteristics, capacitance-voltage characteristics, deep energy levels, generation-recombination processes.

The effect of irradiation mode parameters with nanosecond laser pulses of ytterbium fiber laser with a wavelength of 1064 nm on the dynamics of changes in concentration of defects with deep energy levels is studied. It is shown that irradiation of por-Si film of por-Si/p-Si semiconductor structure at pulse duration of 4 ns and average pulse energy of   J leads to a decrease in concentration of defects with deep energy levels by almost two orders of magnitude. A further increase in pulse duration and its average energy leads to an increase in defect concentration. Laser irradiation leads to melting of surface layer of por-Si film. The mechanisms of processes controlling the change in concentration of defects with deep energy levels are established. The authors show that electrophysical characteristics of the studied por-Si/p-Si semiconductor structure are largely determined by traps with energy levels characterized by complex distribution in the region of activation energies.

V. V. KARASEV, A. A. MIKHEEV. USING THREE-PULSE RESPONSE OF INDUCTIVELY COUPLED CIRCUITS TO TRANSFER DATA THROUGH AIR GAP

The problem of increasing the noise immunity of data transmission from rotating components and mechanisms is considered. The aim of the work is to study the combined effect of three rectangular pulses of different polarity on inductively coupled circuits, causing their specific reaction, which forms the basis of the proposed method of transmitting and receiving data from the rotating part of information-measuring system to its stationary part. For this purpose, amplitude characteristics of individual half-waves of the reaction of inductively coupled circuits to three-pulse input action were obtained, which became the basis for developing a method for transmitting and receiving data through air gap. A circuit diagram of a device has been pro-posed that makes it possible to increase noise immunity of data transmission. A comparison of the degree of noise immunity of the proposed device with that of the known original device was made.