CONTENTS AND ABSTRACTS

RADIOENGINEERING, RADIOLOCATION AND COMMUNICATION SYSTEMS

Key words: majority checks, convolutional code, repeats, probabilistic-temporal characteristics.

The approach to increase probabilistic-temporal characteristics of information exchange in data transmission systems applying the combination of forward error correction scheme with repeated data transmission is considered. The aim of the work is to increase the reliability and efficiency of data reception by rational use of repeated requests accumulated on the receiving side. Different options to transmit check symbols of convolutional code are used as the scheme of encoding. The varieties of convolutional coding and majority checks combinations as well as the ways to distribute check symbols of a code according to blocks sent to a receiver successively using perforation technique are considered. The relevance of the research is caused by the necessity to increase reliability and efficiency in the process of transmitting data to the receiver in the conditions of the limitations on the possibility to change frequency-energy resource of data transmission system.

Key words: linear vector auto regression, Prony's method, spectrum, spectral, parametric estimation, vector time series modeling, redefined equations system of Yule-Walker, quasiinverse matrix, minimization of mean square error.

The article is devoted to the problem of spectral analysis of reflections from a rotating space object in the process of simultaneous observations in different ranges of lengths of electromagnetic waves. The aim of this work is to improve the quality of spectral estimation of process, variability of multi-frequency reflections from space objects. The method of modeling is based on describing experimental data by the sum of exponential functions. Least squares Prony's method is proposed to be used. The exponential model was used to determine energy spectral density of a signal. It is shown that the application of this method in the presence of decreasing (increasing) of signal power and small (1...5) number of observed periods of object rotation enables to reduce relative deviation ΔF (from 2 to 60 times), in comparison with usual vector autoregressive approach.

Key words: PnP algorithms, cluster, reference LED emitter, light emission diagram, peak signal-to-noise ratio.

The aim of the work is the comparison of two algorithms for reference LED cluster selection in optical navigation systems with reference marks: the criterion of maximum LED cluster image area and maximum intensity of reference marks. It is shown that if LED light emission diagram is approximated by the family of parametric curves $\cos^{g-1}\theta_n$ with exponent $g \geq 2$ and peak signal-to-noise ratio $q < 15$ then the cluster selection criteria by maximum intensity is more preferable.

Key words: recognitions of voice information, recognition systems, identification of a person according to voice, method of mean squared deviation, method of minimum distance, method swept-cepstral conversions of RS range, cepstrum, model of Gaussian compounds, optimum number of clusters.

Methods of automatic identification of a person according to voice are researched. The aim of the work is determination of the most effective algorithm of identification of a person on the basis of speech signal providing high probability of correct identification. Pilot studies of the algorithm on the basis of method of mean square deviation, minimum distance, Gaussian mixes are conducted. Identification of a person using the algorithm on the basis of method of mean square deviation isn't completely invariant to initial RS as is effective for short speech messages containing one word. Identification of a person using the algorithm on the basis of method of minimum distance allows to carry out identification at the level of man/woman. One of the most effective methods is the method based on Gaussian mixes model. The optimum number of clusters for recognition is equal to 5. Implementation of the algorithm on the basis of model of Gaussian mixes allows to make correct identification with probability to 75 %.

COMPUTER ENGINEERING, INFORMATION SYSTEMS AND TECHNOLOGIES

Key words: Artificial neural networks, neurocomputers, nanomemistors, operation accuracy, tolerances, signal recognition, squitter.

A general approach to modeling and research of artificial neuron networks based on nano memristors (ANNM) as a system based on the methodology of system analysis and simulation modeling is proposed. When developing ANNM, its functional-structural decomposition was performed with the introduction of several levels of hierarchy: the system; Subsystems; Functional links; Circuit elements. A general approach is proposed to the development of methods for determining and providing quality indicators for ANNM functioning as physics-information objects. An algorithm for determining the tolerances for information parameters of the functional links of ANNM in the process of solving the synthesis problem is developed, which allows to assign tolerances to physical parameters of the means for their implementation. ANNM for detecting infocommunication signal against noise background with parameters in a given range is synthesized and investigated. The tolerances for information parameters of neurons of ANNM are determined to provide a given error in output signal for various noise parameters in input signal.

Key words: CAD/CAM systems, stochastic simulation, holes and shafts, clearances and interferences, tolerances and fits, tolerance intervals, standard fits, recommended and preferable fits.

The task of calculation of tolerance and deviation limits for holes and shafts according to the given limiting sizes of clearance or interference fit is considered. The aim of this work is the development of technique for selecting standard fits that meet specified accuracy requirements with random nature of sizes of holes and shafts. This technique is based on stochastic simulation and takes into account technological features of production. The distribution laws of hole or shaft tolerance intervals can be any and size limits of these tolerances are absent. A method to choose standard fits based on stochastic simulation of mating details sizes have been developed. The conditions of complex application of the method developed in the combination with known methods taking into consideration technological conditions of an enterprise are defined.

SYSTEM ANALYSIS, CONTROL AND INFORMATION PROCESSING

included has been considered. Some simplification of the object is the model of generalized electric machine. Usually applying certain control multichannel object is artificially reduced to single-channel structure. In such systems, by means of force control fast compensation of disturbances while forming the desired motion trajectory is provided. But the possibilities of force control are limited by the voltage of power supply. When all department resources are exhausted, to reduce the time of output value formation in a single-channel system is not possible. Control opportunities are limited and do not allow to adjust multiple output values. The aim of the work is to enter structural parametric compensation of nonlinearity, which provides linear dependence of output values from the task. Using variation method the task to change the state of multi-channel object in minimum time during the formation of multiple output values in terms of set limitations has been solved.

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Key words: Object with delay, Smith's predictor, PI controller, Simulink response optimization, transfer function (TF).

In industrial control systems, there is often a delay, often associated with the transportation of materials or energy. The appearance of Smith predictor in 1957 provided the developers with the opportunity to reduce negative effect of delay on the response quality of the controlled system. In this paper we consider a modified Smith predictor with a filter, used to reduce the influence of disturbances and increase the robustness of control system. Using the Simulink response optimization package, it is proposed to optimize filter settings, as well as PI controller, since manual tuning is laborious enough and does not always allow finding optimal system parameters. In addition to optimizing the parameters, the package makes it possible to take into account the uncertainty of dynamic parameters of control object, in order to ensure the robustness of the system.

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Key words: average portrait, mean image, image transformation, triangulation, reference landmarks, Galton, Perrett, face.

The problem of average image creation using reference landmarks is studied. The aim of the research work is to develop average image creation methods based on averaging transformed group of images using different number of reference landmarks. Averaging methods based on two, three and arbitrary number of reference landmarks using carcass are reviewed. The results of the application of methods on the selection of images of human faces confirm the possibility of creating specialized software for the creation of generalized images.

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INSTRUMENT ENGINEERING AND INFORMATION-MEASURING SYSTEMS

Key words: evaluation of object parameters, active identification, inverted pendulum, stabilization system, polynomial synthesis method, control object, PID – regulators, variation of object parameters, special nomograms.

The problem of estimating the parameters of the inverted pendulum on a cart in the system of angular position stabilization and control of this cart given position is investigated. The linear approximation model includes four integrators and three unknown parameters. Regulators are calculated by polynomial and represent PID – regulators. To solve the problem of estimating the parameters of the object active identification method is used which consists of setting the initial angular position of the pendulum and measuring angular position values of the pendulum and the position of the cart at predetermined times that gives three numbers (amplitudes). Identifica-

ELECTRONICS AND NANOELECTRONICS

T.S. Valova. ELEMENTS CONTROL THE FUEL INJECTION SYSTEM OF AN INTERNAL COMBUSTION ENGINE

Key word: the control system, the internal combustion engine, the fuel injection system, performance, spray nozzle, converter parameters of electric energy, the response time of the injector rise time current travel time of the armature of the injector, exhaust gas toxicity.

The paper considers the elements of the control system of fuel injection, allowing to adjust the response time of high speed electromagnets, depending on the operating mode of internal combustion engine. The aim of the study is to improve operational characteristics of the control system, allowing to reduce response time of solenoid injectors. The response time, especially at high engine speeds, affects the completeness of combustion and environment ecology. Dosing the amount of fuel depends on the duration of electric pulse supplied to the winding of solenoid injectors electronic control system. The duration of an electrical pulse injector control is calculated by the microcontroller of the electronic system of engine control module (ECM) based on signals of sensor values of throttle opening, air temperature, engine temperature, engine speed, load, and other sensors. Stability of indicators of the injector is largely determined by the performance of its valve. For this reason, when designing high-speed electromagnets reducing response time and time of the release is said to be a high priority.

V.G. Gorohova, A.T. Rott, A.I. Kudyukin, E.N. Moos, V.A. Stepanov, L.F. Sjatisheva. EXHAUST-TUBELESS TECHNOLOGICAL PROCESSES FOR CERAMIC-METAL HIGH-VOLTAGE VACUUM ARC EXTINJUISH CHAMBERS PRODUCTION (VDK-110)

Key words: vacuum, technologies, arc extinguish chamber, ceramic-metal, arc, electrodes, outgassing, nodes, pumping, temperature, sealing, a jacket, soldering, solder.

The diagram and the device of ceramic-metal high-voltage vacuum arc-suppressing chamber (KDV) is described. The technological chain of assembly of KDV conductive node is provided. The technology of exhaust-tube group pumping, soldering, annealing is described. Manufacturing technique features of arc-suppressing cameras on 110 kV are shown.

The aim of the work is increase in production capacities of enterprise and implementation new large-size cameras into production. The question to increase the resource of vacuum arc-suppressing cameras to 105 switches by increasing plasma stability in vacuum arc chamber and the complex of other constructive and technology solutions is considered. The main means for increase the output is the transition of production from nowadays accepted option of exhaust-tube pumping of cameras to exhaust-tubeless technology of receiving vacuum. In the course of pumping there is deleting of all gases both free and dissolved in product details from the volume of product. These purposes require long warming up of a jacket and details of products at the temperature up to 5000 C.