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Content

Optoelectronic System for Monitoring of Oil Content in the Purified Water Based on the Element of Frustrated Total Internal Reflection

Nematzhon Rakhimov, Sherzod Madumarov, Donier Islomov, Aleksey Serioznov

Abstract. To suggest new design optoelectronic multifunctional test-systems on the base of semi conducive optron of an open channel have been constructed and worked out for the first time. Which distinctive features is that a ditch is made in the form of a transparent sphere, in side has a cavity in a form cylinder, and at the centre cylinder installed the cylindrical or prismatic silver reflecting surface, and also the switch of optical pairs. In the each parameter is supervised by four radians and detectors the open channel.

Keywords: emitting diodes, emitting receiver (OER), destructed full inner reflection (DFIR), optoelectronic systems.

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Determination of the Phase Shift Values by Interference Patterns in the Phase-Shifting Interferometry

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Abstract: The paper discusses the algorithm of the explicit determination of the phase shift of series of interference patterns obtained by incremental phase shift, which is the result of a solution of the transcendent equations.

Key words: phase steps method, interferogram, decoding equation.

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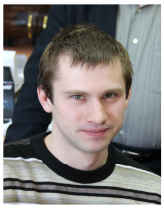

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Identification of Linear Dynamic Systems Using the Concept of Parameter Space Separators

Tatyana Avdeenko

Abstract: The paper ovserves the problem of structural identifiability of models in state-space. We offer an effective approach to the analysis of structural identifiability, including a necessary and sufficient condition for the analysis of both local and global identifiability, as well as procedures for the elimination of unidentifiable. Unlike other methods, this approach requires a significantly smaller amount of symbolic computation, and thus it allows the analysis of models of large dimensions. This paper describes the essence of the proposed approach, given the definition of the weak, the true and the false separators, as well as an algorithm for constructing true separators. It is also considered an example of the existence of three linear separators model structure corresponding to the six decisions of the problem of estimating the unknown parameters, detected their geometric arrangement and properties.

Key words: parametric identification, identifiability of linear dynamic models in the state space, parameter space.

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Numerical Optimization of PID-Controllers Using the Correct Motion detector in the Objective Function

Vadim Zhmud, Oleg Yadrishnikov

Abstract: Controller optimization for systems that are prone to fluctuations due to the specificity of the object model is difficult to implement numerical methods, even in the presence of a well-proven technique. The paper suggests ways of modifying the objective functions to solve this problem effectively. The effectiveness of the proposed approach is demonstrated by examples.

Key words: numerical optimization, controls, automation, modeling, dynamical systems, control accuracy

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Fractional PID-Controllers and Ways to Simplify Them with Increased Efficiency of Control

Vadim Zhmud, Aleksandr Zavorin

Abstract: Thepaper recearches the possibility of achieving simpler control comparable or better results in comparison with the known method of synthesis $PI^{\lambda}D^{\mu}$ sophisticated controllers, more complex than the well-known and widely used PID-controllers. The result demonstrated the ability to achieve the best results in a simpler way.

Key words: numerical optimization, controls, automation, simulation, system dynamics, steering precision

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Software for Laser Measuring of the Crustal Deformation

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Abstract: The paper discusses the main challenges facing the software for processing the laser measuring signals which are used to measure crustal deformation, and the results of their decisions.

Key words: software, crustal deformation, earthquake precursors, distance measuring, shifts measuring

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Spatial Filtering of Seismic Events Occuring in Hydraulic Fracturing

Evgeny Rabinovich, Pavel Vainmaster, Jury Novakovskiy

Abstract: The paper proposed and built a three-dimensional model of fracture zones producing formation during fracturing. To eliminate data redundancy locations original spatial filtering has been applied.

Key words: Hydraulic fracturing, crack, proppant, micro-earthquakes, filtration, Delaunay triangulation.

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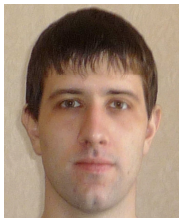

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Optoelectronic Measuring and Information System for the Detection of Strench of Dams

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Abstract. This paper outlines the methodology and the results of experimental research of mechanical characteristics of fiber light guide (Sun), for use as a sensor for detection of dams.

Key words: solid-state light-emitting diode, laser diode, receiver of optical radiation and fiber light guide and optoelectronic system.

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Harmonization of Technical documents in Information Systems of Data Management

Anna Vichugova, Vladimir Vichugov, Gennadiy Tsapko

Abstract: We consider the information category PDM data management system on an example of PDM-system Enovia SmarTeam. The pape described documents matching process and its implementation. It is proposed to use the provisions of the theory of parallelization and synchronization operations for the distribution of tasks between the performers. Completed development of algorithmic basis in the form of UML-diagrams for creating software significantly extends the standard functionality of the PDM-system.

Key words: information systems, electronic document management, software design.

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Digital Adaptive Controller for Controlled Objects of the Third Order

Maksim Skorospeshkin, Vladimir Skorospeshkin

Abstract. The paper showed the possibility of creating a digital adaptive controller based on optimal digital control and serial digital adaptive equalizer of dynamic characteristics of automatic control systems with a phase advance. It was found that the use of such digital adaptive controller can significantly improve the quality of transient processes in non-stationary objects of automatic control systems. It is concluded that such a system it is advisable to use both in the regulation of technological parameters of non-stationary objects, and in the regulation of technological parameters of stationary objects that come perturbations that lead to oscillations of the controlled variable with an amplitude exceeding permissible one.

Key words: Digital regulator, corrector of dynamic characteristics of automatic control systems with phase advance, the quality of regulation, regulation transient object.

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Software System for Cluster Analysis of Mixed Types Data

Olga Alsova, Kseniya Uskova

Abstract: The paper describes the structure, functionality, application software system of cluster analysis of mixed type MixDC - Mixed Data Clustering. The software system is implemented as a set of original and standard algorithms for clustering mixed data and assesses the validity of clustering solutions. The software system can be used in different subject areas. The algorithms presented in MixDC, tested on real medical data. These results suggest a promising use of a software system as a means of solving the problem of clustering mixed data.

Key words: cluster analysis, the data of the mixed type, the similarity measure, clustering algorithm, the software system.

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Implementation of Remote Control via Radio Bluetooth Platform simulating Robotic Tools

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Abstract: The main aspects of building software and hardware module to the platform, as described in the article “Building simulates a robotic platform means on the basis of the designer Lego Mindstorms NXT 2.0 in the motor control parts” for remote control of the radio platform through Bluetooth.

Key words: Bluetooth, HC-05 module, data transfer, remote control, radio, robotics, mikrokon¬troller, software, STM32.

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Building of a Platform Simulating Robotic Means on the Basis of the Designer Lego Mindstorms NXT 2.0 in Terms of Motor Control

Aleksey Eskin, Vadim Zhmud, Vitaly Trubin

Abstract: We consider a platform for modeling and studying robotic means on the basis of servo motors and parts from the designer Lego Mindstorms NXT 2.0 and debug board STM32VLDISCOVERY.

Key words: robotics, microcontroller, software, designer Lego Mindstorms NXT 2.0, debug board STM32VLDISCOVERY.

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Intellectual and Adaptive Methods for Ensuring of the Information Network Security

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Abstract: The paper describes the successful implementation of stochastic methods of ensuring the information security of the network as a firewall system with intellectual and adaptive properties based on genetic algorithms and the use of invoice “traps” are considered in this article.

Key words: distributed attacks, firewall, genetic algorithmization.

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Development of an Integrated Biotechnology System for Monitoring and Correction of the Human Body's Vital Functions Parameters during Sleep with the Syndrome of Obstructive Sleep Apnea and its Consequences

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Abstract: The paper describes the design principle of the work developed by the biotech system designed to deal with obstructive sleep apnea syndrome and its consequences.

Key words: biotechnical system, obstructive sleep apnea, snoring elimination, sudden death during sleep.

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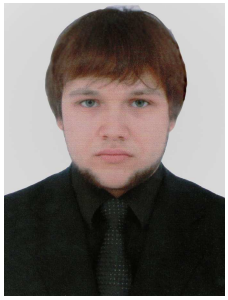

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Development and Research of Adaptive Methods of Swarm Intelligence to Scheduling Problems

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Abstract. The paper gives the analysis of the methods of swarm intelligence and a new approach to research and improve the efficiency of these methods in the field of scheduling problems. The proposed approach is based on evolutionary adaptation parameter algorithms to the conditions of each specific task using a genetic algorithm.

Key words: swarm intelligence, adaptation, the ant colony algorithm, particle swarm method, genetic algorithm, scheduling.

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Optoelectronics Yesterday, Today and Tomorrow

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Abstract: This paper is intended for students interested in education in the field of development and application of optical devices and systems.

Key words: optoelectronics, optics, optical systems.

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Mathematical Model of the Propagation of Light in Space

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Abstract: The paper deals with the mathematical model of the propagation of light in the space and structure of the optical imaging system recovery.

Key words: light, field theory, mathematical model.

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