ABSTRACTS AND REFERENCES

MODEL OF AUTOMATED DESIGN OF ASSEMBLY PROCESS

page 4–8

The article provides an analysis of the basic laws of the assembly process simulation. Mathematical formulas describing the basic properties of the structure, as well as the interdependence of design elements are given. The basic requirements for the order of the assembly process, based on the conditions of locating and access are revealed. The process of order formation of the product assembly process is considered.

It is given the generalized model of the assembly process. It is formulated objective function of assembly that takes into account the incidence matrix, the matrix dimensions, as well as an array of logic regularities characterizing the combination of assembly units in detail. This model allows to create a basis for the development of specific models that have already correspond to the objective function and will simplify and speed up the design process of the assembly.

It is proposed the frame model representation of assembly process representation, which allows to formalize the assembly of individual units, select the best sequence of assembly of plurality of possible sequences.

These models can be the basis for assembly design automation using intelligent technologies such as voice control.

Keywords: assembly, process, frame model, industrial robot, objective function.

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INFORMATION TECHNOLOGY OF DECISION-MAKING SUPPORT AT CONTROL OF CENTRAL HEATING MODES

page 8–13

The problem of improving the efficiency of the heat load regulation of buildings is solved in this article. It is proposed an approach that takes into account both the meteorological and social components of influence on the building requirements of social and public sector in warmth providing. First, it is analyzed the methods of decision support in the heat power engineering. It was found that information technologies have the potential for solution of energy problems. The authors propose a system model of decision-making process in the area of control of building heat requirements. On the basis of these models it is developed the information technology of decision-making support at control of heating modes of social and public sector building. The use of the proposed technology will support the grounded decisions about heating mode regulation of buildings. So it is prevented from above-limit heat energy consumption by social-public sector.

Keywords: system analysis, decision-making support systems, heat, energy demand, forecasting, fuzzy logic, information technologies.

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USING THE NETWORK TECHNOLOGIES WITH FORMATION THE SMART-TEXTBOOK IN THE LEARNING PROCESS

page 13–17

It is defined the main purpose of Smart-textbook — to give a knowledge and practical skills in the use of new technologies due to the transformation of the information society into a new quality, which is called Smart-Society. In accordance to requirements (flexibility, integration, individual trajectory and other) which is responsible a smart-textbook, it is formed the requirements for technology of its creation: use of cloud technology in the process of creating and using of smart-textbook, enhanced use of multimedia, interactive educational tools. The article shows examples of work organization at the Smart-lesson, the process of «teacher-student» interaction, creation of new textbook that dynamically modifiable by the Smart-pupil, conducting lessons with multimedia and computer support, activation of cognitive interest of learners, which generally contributes to the development of distance education. Teacher just update the material to create a Smart-textbook submit it in accordance with the evaluation criteria of its quality, add the necessary training ele-

ments and organize an individual learning strategy for each learner, consider the individual criteria for assessing the educational achievements of learners and formation of their XXI century skills.

Keywords: Smart-textbook, Smart-society, Smart-education, primary stage of study, discussion stage, purpose, educational resources, learning process.

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wind and sun, on the basis of the analysis information flow in it. It was indicated key factors influencing to the production of electricity and were generated questions, the answers to which gives the system. During creating the proposed architecture was decided to use the client-server technology with the assistance of software agents. It was established that the proposed method of agent-based modeling allows to make an independent work of the grid investigation from access of ordinary users.

Keywords: distributed generation, information systems, agent-based modeling, simulation, database.

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INFORMATION TECHNOLOGY CONTROL OF ALTERNATIVE ENERGY OBJECTS

page 17–22

The significant losses of useful energy that occurs during transportation energy to the end users from large power plants to ultimate users causes to look for alternative ways of organizing the activities of the grid. Hybrid energy system based on renewable energy helps to achieve an optimal relationship between generation and consumption of energy. Thus, paper discusses the topicality of the using of information technology for renewable energy control in the construction of hybrid grids and also problems arising in this case.

Here are proposed the architecture of analytical information system for control of hybrid power systems based on the energy of

A STRUCTURE OF FORMING AND TRANSFORMATION OF INFORMATIVE RESOURCE IN INFORMATION TECHNOLOGY OF MEDICAL EQUIPMENT REPAIR TECHNOLOGICAL PROCESS

page 22–26

The analysis of the existent systems of medical equipment exploitation is conducted. It is determined that the level of medical equipment exploitation depends on the timely and quality process of service and repair, that, in turn, affects results of raising of medical diagnosis to the patients. The method of evaluation of the actual technical state is offered for upgrading of medical equipment exploitation, that is base on the use of informative resource in relation to the evaluation of the functional modes: control of capacity, diagnosing and prognostication of the technical state. For practical realization

of effective method of medical equipment repair the structure of forming and transformation of informative resource is worked out in information technology of technological process of medical equipment repair. It is shown that the offered method provides possibility of estimation of the actual technical condition in use and diagnosing prospect with the set depth of troubleshooting and forecasting of technical condition of the medical equipment.

Keywords: medical equipment, actual technical state, information technology, computerized informative system.

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METHOD OF DETERMINING KEYWORDS FOR ENGLISH TEXTS BASED ON DKPRO CORE

The approaches to search of keywords in text that are divided into two linguistic and statistical categories are considered. Linguistic methods are based on the meaning of words, especially using ontologies and semantic information of words. Unfortunately, these methods are resource-intensive in the early stages — development of ontologies, for example, is very time-consuming process.

It is proposed a new method for determining the keywords based on finding connections between word forms of the English text with the instrumental capabilities of package DKPro Core. The method, which illustrated with examples of analysis, aimed at solving problems of efficient processing of text documents — indexing, abstracting, clustering and classification.

As a result of theoretical and experimental studies it is found that the developed method found more keywords, specified by the author of the text, compared to analogues. In addition, the proposed method without additional filters at least 5 times reduces the number of stop words among the top ten important (key) words. The results can be used to improve the accuracy of the content analysis of the site and raise the site position in search results.

Unlike the existing methods the proposed method of determining the keywords based on the use of additional information about complex relationships between members of the English sentence. For the functional implementation of text analyzer it is selected the popular linguistic package DKPro Core. Experimental studies of theoretical substantiation of method are proved its quality advantages in comparison with known analogues.

Keywords: method, keywords, English, linguistic package, DKPro Core, syntactic analysis.

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STATIC AND DYNAMIC MATHEMATICAL MODELS OF ROUGHNESS OF EXTENDED SURFACES

In this article it is discussed the possibility of forming a mathematical model (MM) of undulation as a dynamic model of roughness by measuring the roughness profile ordinates and calculate its static characteristics for simple surfaces.

The main goal of the research is to develop methods for improve the accuracy of the experimental data processing systems (EDPS) with integrated software controlled adaptive channels (SCAC) based on analog inductive contact sensors (ICS) with extended measure-

ment range of roughness ordinates resistant to impact load and the influence of external magnetic fields.

The basic invariants for adaptive EDPS of quality control (EDPS-C) at change of condition are the total error as the defining quality index of EDPS-C and optimization programs that implement methods to improve accuracy.

In the article it is discussed one of the methods of improving the accuracy of analog-digital EDPS-C with integrated SCAC consisting in estimation the algorithm for calculating of the central moments of static MM of roughness by introducing the table correction coefficient, which allows to adapt the EDPS-C.

Due to the shown possibility of MM forming of undulation as dynamic MM of roughness can calculate its static characteristics for simple surfaces by measuring the ordinates of roughness profiles of ICS moving on independent linear basis.

Keywords: static mathematical model, dynamic mathematical model, roughness, undulation.

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METHODS OF PARALLEL TEXT DATA CLUSTERING ALGORITHM IMPLEMENTATION

The general algorithm of the organization of parallel calculations is considered. The features of the organization of process of parallel calculations are given; the criteria indicating ability of algorithm to representation in a parallel form are defined. The information concerning algorithm of Maximin is provided, the software for algorithms parallelization is considered. The version of the specified algorithm constructed on the basis of parallel calculations is developed. The problem of a clustering by means of parallel calculations with use of Maximin algorithm is solved, it is possible thanks to existence of at least two operations with uncorrelated results in algorithm. Parallel implementation of calculations shows

the reduction of time of algorithm execution even with two processors. It is proved that the increase in productivity of algorithm depends linearly on the number of calculators increasing. The results received in work confirm expediency of use of parallel implementation of Maximin algorithm that in turn increases efficiency of data clustering process.

Keywords: parallel calculations, clustering, Maximin, algorithmization, productivity.

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CONSTRUCTION METHOD OF CYBER ATTACKS CLASSIFIER ON GOVERNMENT INFORMATION RESOURCES

Dynamics of successful realizations of cyber attacks, the object of which are public information resources, demonstrates the need to improve their security. One problem that hinders the implementation of effective information security systems, such as attack detection systems, is their inability to provide reliable and timely event pattern classification of information and telecommunication systems. In research materials it is proposed an approach that enhances the efficiency of attack detection systems for government information resources by the speed criteria for the given parameters of classification accuracy. This is achieved through the introduction of CBA two-step classification scheme, based on binary grouping patterns of the system behavior. The developed construction method of cyber attacks classifier, based on decision trees and optimized flow of incoming data, can reduce the construction and operation of classification models at times and provides the performance of classification accuracy of system behavior patterns.

Keywords: information and telecommunication system, cyber attack, classifier, classification, decision trees, optimization.

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DESIGN OF INTELLIGENT SYSTEM FOR DIAGNOSTICS OF TECHNICAL STATE OF BUILDING OBJECTS

It is developed a modular scheme of intelligent system for the diagnostics of technical state of the object, which is a highly specialized CAD. It is proposed a fuzzy model to predict the fracture processes of concrete and reinforced concrete structural elements. Using the data model of continuous control of the parameters of acoustic emission waves and expertise allows taking into account the dynamics of destruction under random loads and fields.

Integration with the calculated set of universal CAD system allows: increase for proposed system the degree of automation and reliability of diagnosis at different periods of the life cycle of buildings, improve forecasting quality and increase the probability of timely measures to prevent the critical situations.

Using the diagnosis data can significantly affect the choice of method for calculating the stress-strain state of the structures in the design.

Keywords: acoustic emission, diagnostics, intelligent system, fuzzy model, continuous control.

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COMPARATIVE ANALYSIS OF METHODS AND INFORMATION MODELS OF STRUCTURING INFORMATION IN EDUCATIONAL PROCESS

In this work comparative analysis of methods and information models of structuring information in educational process was carried out.

Presented analysis describes the advantages and disadvantages of existing models and methods in preparation of elementary educational units — modules.

As a result of this review three criteria for models of educational material presentation were established: the complexity of structuring the full amount of educational material, the number of units of the model, the effect of the absence of several elements of the model on system general operation.

It is shown that none of the models and methods do not allow to determine the indicator of volume and repetition time, it is important for recovery in the memory of previously studied material and activation of mental abilities of students.

Keywords: quality of education, model and method of structuring information, granule of information.

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USAGE OF GROWING PYRAMIDAL NETWORKS AND SYSTEM ANALYSIS METHODS IN FORMALIZATION OF USER MODEL OF INFORMATION NETWORKS

In this paper approach to development of user model of Information Networks is presented as fuzzy formalized object and using methods of system analysis. The aim of research is increasing of efficiency and reliability on Information Networks modeling by formalization of one of the most important input parameters: model of Information Networks user. Complexity of object which is Information Networks user is in its versatility, unevident relations and connections between its parameters and severeness of parameters location. Existing methods of system analysis for complex objects are developed for usage in concrete object areas and so this methodology for Information technologies area was not suggested yet. According to development of user model of Information Networks should be provided by heuristic methods using methods of system analysis of fuzzy formalized objects. In this paper method of growing pyramidal networks is proposed to be used as tool of development of Information Networks user mode. It allows recover connections within non-correlated parameters and proposes classes of users based on parameters and users needs. Information Networks users' mode is supposed to be used in modeling and development of Information Networks, predictions of its growth based on its changing inner parameters and need of Information Networks users.

Keywords: Information Networks, user, fuzzy formalized object, system analysis, growing networks.

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RELIABILITY PREDICTION OF DISCRETE DEVICES BY MODELING THE PROCESS OF MATERIAL DEGRADATION

The paper studied the causes of degradation microcircuits that are made of semiconductors for reliability of discrete devices of computer systems. The function of reliability of discrete devices S based on the previously described model of composite materials, reflecting the behavior of the material discrete device with accounting completed physical processes in the material. In the analysis of metal-non-metal, metal-metal systems exists a special area — a thin layer that has excellent physical and chemical properties of major components and affect the reliability analysis of discrete devices. This layer is responsible for the strength of contact and is the link between phases.

To achieve this aim it is analyzed the causes of microcircuit degradation; it is given the classification of used methods for evaluating the reliability; the reliability prediction algorithm of discrete devices is described and the structure of intelligent subsystems of reliability prediction of discrete devices is given. The numerical implementation of these tasks carried out in accordance with the algorithm using existing mathematical software with some additions.

Research of mini-phase interaction models in composites allows to investigate treatment of a composite system in real time without substantial financial and material costs, which in turn allows to predict the causes of material degradation of discrete devices with greater accuracy.

Keywords: reliability, degradation, discrete device, composite material, algorithm, prediction.

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INCREASING THE VIABILITY OF THERMALLY LOADED DETECTOR ARRAY

The causes of distortion of the laser beam as it passes through the atmospheric channel are presented. It is shown that for industrial lasers used for cutting of materials, beam spreading reduces the density of the power distribution across the beam, which changes the

nature of radiation interaction with the processed surface. Control by density distribution over the cross section of the radiation beam is an actual problem that improves the quality of processing of material and reduces the required energy.

It is noted that the control system of the laser power density distribution containing matrix power meter with thermoelectric coolers, thermal control receivers when measure high radiation intensities, have significantly lower values of reliability, since the failure rate depends on the thermal load and decreases by orders of magnitude compared to rated load. Failure of the matrix element leads to the formation of incorrect control to the executive body of the change in the shape of the laser beam.

It is analyzed an approach to increase the viability of the matrix thermally loaded detector based on the dependence of the response elements of the matrix and its environment, that allow to ensure the correct reaction of control system in case of failure of the elements of perception of input information. The model means providing a visual representation of the results are developed. It is shown that the information methods can improve the viability of the system.

Keywords: operability, reliability, thermally loaded elements, signal, interpolation.

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THE ACCURACY INCREASING METHOD FOR THE PARAMETER ESTIMATION OF DISCRETE SUBSTANCES IN THE STREAM

It is shown the problem of investigation of structural properties of measuring signal in parameter estimation of discrete substances in the flow measurement to obtain information on the quality of these substances. It is developed a method for improving the accuracy of estimates of the parameters and it is proposed the scheme for its implementation, which provides the calculation of sample statistics, that is optimal by criterion for standard deviation, for a given precision of measurement, for a given sample size at given time observation. It is developed a generalized block diagram of problem-oriented IMS of moisture of granular substances. It is proposed an implementation variant of IMS data processing device based on developed method and it is investigated its metrological characteristics. As a result of investigation it is found that the proposed scheme is strong; reduces measurement errors of material moisture in the flow (for 10–15 % moisture is about 1,5 times, for humidity >20 % is about 1,2 times); allows to make the most complete integrated picture of the state of matter in its delivery and acceptance; accelerates the acceptance and delivery of a substance that is economically feasible.

Keywords: structural analysis, spectral analysis, information and measurement systems.

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