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ANALYSIS OF THE STRUCTURAL MODELS OF COMPETENCIES IN PROJECT MANAGEMENT

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The analysis of structural models that reflect the topology of project management processes using directed graphs is performed. It is shown that the essence of the analysis of directed graphs is connected with the determination of closed cycles. To solve the problem of analysis of structural objects, it is proposed to use the method of analytical definition of cycles in complex systems describing the set of competences in the field of project management. At the same time, it is necessary to take into account the industry component of the field of knowledge. The requirements for the evaluation of competencies, as well as for the system of training professionals in the field of project management, it would be very logical to harmonize with the specifics of the industry. At the same time, universal models do not offer acceptable solutions. Therefore, in this research, it is proposed to resolve this contradiction on the basis of an analysis of the system of competencies as directed graph.

The possibility of structural analysis of directed graphs due to specific properties of adjacency and reachability matrices is proved, which makes it possible to automate the structural analysis of control schemes based on the competence approach.

Aspects of knowledge management are traditionally considered as the main component of project management and as an object of study in the professional training of project managers. The second direction is, strangely enough, the least studied, although the training and trainings allow to resolve the contradictions of the project management. Existing approaches to knowledge management in the field of professional project management do not always provide an effective formation of the education trajectory due to the lack of models, methods and means of analyzing the relation of competencies. The mutual relations of competences form the core of knowledge that forms the basis of fundamentally new provisions in the formation of the content of academic disciplines. The theoretical provisions of this study can be applied in the practice of professional project management and advanced training to form the trajectory of career development of personnel.

Keywords: competence approach, directed graph, adjacency matrix, closed cycles, analytical search.

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EVALUATING THE EFFECTIVENESS OF ADAPTIVE ANTENNA ARRAY IN WEIGHT COEFFICIENTS DISCRETIZATION

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Currently, there is a shortage of using radio resources in the world and there is an acute need for using additional physical resources that increase the bandwidth of communication channels and increase the productivity of mobile communication systems in general. The use of space-time physical parameters in the organization of multiple access (STA) of subscribers is becoming relevant.

The methods of subscriber stations (SSs) STA to the resources of the base station (BS) are based on the use of N -element adaptive antenna arrays (AAA). The methods and algorithms of AAA synthesis are based on the evaluation of the complex vector of weight coefficients (VWC) included in the reception paths of each antenna element (AE) and controlled by various algorithms. Therefore, the object of research is the process of discretization of the weight coefficients in the adaptive antenna array.

The main disadvantage identified during the audit in this study is the calculation of the computational complexity of the quantization algorithm for weight coefficients for different variations in the parameters of the signal-interference situation at the AAA input.

Complex, systemic evaluation of the effectiveness of AAA functioning taking into account the chosen criterion of the effectiveness of the AAA operation, using the procedure for quantizing the weight coefficients, is possible with a broader and precise specification of the parameters of the operating signal-interference environment. This will allow to obtain reliable results.

The required dimensionality of the adaptive array antenna weights is determined depending on the ratio of the total interference power to the internal noise power at the input of the bandpass filter, based on the allowable decrease in the average output signal-to-interference-plus-noise ratio.

On the basis of the obtained analytical estimation of the loss rate, an expression for calculating the required quantizer capacity is proposed. It is possible to show that, regardless of the amount of allowable losses, the required quantizer capacity is increased by 1 bit with an increase in the input interference/noise ratio by 6 dB.

Keywords: discretization of quadrature components, weight coefficients, antenna array, loss rate.

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A COMPARISON OF THE E-GOVERNMENT SYSTEM ARCHITECTURE IN JORDAN WITH THE E-GOVERNMENT SYSTEM OF THE UNITED STATES

page 18–24

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The research seeks to examine the structure of the E-government system in Jordan and comparing it with that of the United States. The research is based on the finding that few researchers have attempted to develop a good analysis of the Jordanian e-government system architecture, especially by making comparisons with those of developed nations like the US. Consequently, there is a knowledge gap in this field, which should be filled by analyzing the nation's e-government system architecture and comparing it with that of a developed nation. The aim of this study was to determine the structure and composition of the e-government system architecture in Jordan. In particular, the study sought to determine how the structure is set and how it works by analyzing it in comparison to that of the United States, a developed nation and one of the countries that was among the first to adopt e-government systems. The researcher seeks to analyze the e-government architecture adopted in Jordan (a developing nation), to compare the e-government architecture in Jordan with that of the US and to determine the challenges facing the architecture in the country. Based on a qualitative analysis of the e-government system architecture in Jordan and comparing it with that of the United States, the study finds that the E-government system in Jordan has improved service delivery to the citizens because it provides timely, less costly and effective services. Nevertheless, it is prone to information threats and needs continuous improvement. Further, it is also less effective compared to that of the US, especially because the level of hierarchy in the Jordanian government is higher than that of the US. Despite this, it has been found that new e-government system has an advantage because it can continuously be improved by adding new technologies and infrastructure to tackle the above-mentioned problems.

Keywords: E-government system architecture, E-government services, E-government system in Jordan.

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DEVELOPMENT OF METHODOLOGY OF EFFICIENCY ESTIMATION OF MANAGEMENT TECHNOLOGY OF PROJECT-ORIENTED ORGANIZATIONS

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Support for the competitiveness of modern companies is realized through the application of the methodology of project management. The project management subsystem should be harmoniously integrated into the enterprise management system. At the same time, the coordinated operation of the project and operating subsystems should be ensured.

The interaction of the project and operating subsystems of the project-oriented enterprise can be realized within the framework

of several approaches – the homeostatic approach, the bi-adaptive management approach.

To create management systems for project-oriented enterprises that work in concert, it is necessary to evaluate the interaction of management subsystems.

The article poses the task of estimation of the interaction between the projects subsystem and operating subsystem of a project-oriented enterprise. The essential parameters of the operating subsystem and project subsystem are divided into ten groups of parameters. In the operating subsystem 28 parameters are allocated, in the project subsystem – 27.

A method of combined analytical and expert estimation of the mutual influence of the project and operating subsystems of the project-oriented enterprise (MAEM method) is proposed. The eight steps of the method implementation are described – an analytical estimation of the state of parameters that can be estimated accurately; Selection of candidates for two expert groups (from operating managers and project managers); Determination of competence coefficients of candidates for experts; Identification of experts; Estimation by experts of the interaction between the parameters of the project and operating subsystems; Determination of the most sensitive parameters; Determination of deviations between expert group estimates; Formulation of conclusions. The method is based on expert estimation

The strengths, weaknesses of the method, its opportunities and threats are analyzed.

The method will allow to create coordinated control systems for project-oriented enterprises.

Keywords: project-oriented enterprise, operating subsystem, project subsystem, bi-adaptive management, homeostatic approach.

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SYSTEMS AND CONTROL PROCESSES

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CHEMICAL ENGINEERING SYSTEMS MODELING AND EFFICIENCY ANALYSIS OF HEAT AND MASS EXCHANGE

page 30–37

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The object of research is the chemical engineering system and the heat-mass exchange processes taking place in it. In engineering practice, systems are represented by process flow diagrams. The lack of standardization in the graphical representation of engineering systems does not allow creating a general logic for reading the graphic information and then processing it with the software for analyzing the energy efficiency of the chemical engineering system.

The rules for creating flowcharts, symbols for devices, and the chemical engineering system representation technique are developed, allowing any engineering system to be transformed into its topological representation. To combine the two branches of different networks and organize the heat and mass exchange processes in the system are elements intended for heat and energy exchange between networks with streams pair interaction.

Mathematical models of heat and mass exchange networks for chemical industry have been developed, and energy efficiency and mass transfer efficiency criteria have been introduced. This allows to:

- construct a software environment that generates a system model based on its topological representation;
- analyze various options for implementing the process flow diagram for finished products production;
- synthesize the optimal, energy-saving production option.

A numerical experiment was performed using a modeling software developed by the German company NETWORK SOLUTION DEVELOPMENT CO and transferred for testing. The model adequacy to the real engineering system approves the comparison of the model parameters and the parameters of the design regime of the urea production synthesis unit. The error in determining the mass flow rates doesn't exceed 2.4 % on branches, and the temperatures values at the nodes are strictly correspond to the technological regulations.

Preliminary analysis indicates the possibility of improving the energy efficiency of production due to the integration of heat streams within the production cycle and the structural and parametric optimization of the engineering system.

Keywords: process flow diagram, topological modeling, modeling techniques, heat and mass exchange efficiency, chemical engineering systems.

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MODELING OF INTERCITY PASSENGER TRANSPORTATION SYSTEM

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The modern state of modeling of intercity passenger transportation systems is considered. It is determined that the search for various options for technologies of interaction between the society and the transport industry is constantly at the stage of searching for the best possible methods of transportation organization. To assess the proposed scientific approaches, full-scale measurements are carried out on the route flows of passengers on sections of route routes. The approach to modeling intercity passenger route transportation systems is considered as original in the article, taking into account economic, social and organizational components. These components determine the overall efficiency of the transport process. Together with this, the above approach can be improved. To do this, it is desirable to consider in more detail individual subsystems by mode of transport and separately allocate night and day transportation. Practitioners note that with the same parameters of the trip, people feel differently the consequences of a day and night trip. This can lead to different requirements for the transport network as a whole. But the above algorithm allows to take this into account. The means

for assessing the performance parameters of the system of routes for passenger transportation systems are explored. The sequence of formation of the transportation system of intercity passenger transport is proposed, which relies on the achievements of science and practice and takes into account the patterns of distribution of transport correspondence between cities from the transport network. The attraction functions between cities are complemented in accordance with the number of inhabitants and purchasing power. New information has been obtained on the modeling of transport route systems for transportation of passengers between cities within the investigated system. This is more advantageous in comparison with analogues due to the consideration of ensuring the social and economic characteristics of the population, the possibility of increasing productivity by optimizing the use of the route network and meeting the economic interests of the transport industry.

This is more advantageous in comparison with the analogues due to ensuring the registration of social and economic characteristics of the population of Ukraine, a possible increase in productivity by optimizing the use of the route network, satisfaction of economic interests of the transport industry.

Keywords: route system, transportation efficiency, passenger correspondence, transportation process.

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CONTROL SYSTEM SYNTHESIS OF FORMATION OF CARBON PRODUCTS

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The object of research is the process of formation of carbon products.

The production of carbon products is characterized by considerable resource and energy intensity, therefore the actual task is to increase the efficiency of this production by introducing the optimum operating modes of its component technological processes.

One of the main technological processes in the production of carbon products is the process of their formation by squeezing of the electrode mass through a mouthpiece of the corresponding shape in a hydraulic press. All inherited properties that determine the quality of finished products are laid at the stage of pressing the electrode blanks

The analysis of the existing control systems for the process of formation of carbon products shows that the formation process is a typical cyclic process. For such processes, the control task is, as a rule, to implement such controls that would ensure that one or more output variables are tracked by a predetermined path of motion, which is repeated from cycle to cycle.

A new control system is proposed that provides for iterative learning control in formation of the electrode mass by squeezing through a mouthpiece of the corresponding shape in a hydraulic press. The corresponding ILC algorithm is proposed. Thanks to this solution, a high quality control is provided in the absence of initial uncertainties and external disturbances.

Keywords: carbon products, iterative learning control (ILC), control system, ILC algorithm.

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EXPERIMENTAL RESEARCH OF WEAR INTENSITIVITY OF 9 mm PISTOL BARREL WITH THE USE OF LONG-TERM STORAGE AMMUNITION

page 48–54

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The process of deteriorating the ballistic characteristics of barreled weapons in general and pistols in particular is directly proportional to the barrel bore wear process. The use of long-term storage ammunition, in comparison with the guarantee ammunition, aggravates the patterns of deterioration of ballistic characteristics and increase in the wear rate of the pistol barrel on the number of shots.

On the basis of the obtained patterns, the dependences of the increase in barrel wear and the decrease in the initial bullet velocity from the ammunition storage period are established.

The maximum ammunition storage period in 28.92 years is predicted, the use of which will not lead to a decrease in the minimum

allowable initial bullet velocity (299.25 m/s) within the established barrel resource.

A possible error in the forecast is determined at 25.2 %, and therefore ammunition storage period without decrease in the minimum allowable initial bullet velocity is reduced to 21.63 years.

Keywords: 9 mm pistols, barrel bore wear, long-term storage ammunition.

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