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## Abstracts and Keywords

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### **Simulation Modeling as a Tool to Support Management Decision Making**

*Keywords:* IT projects; analytics; management style; enterprise operations; management decisions.

*Abstract.* The purpose of this paper is to analyze the toolkit of simulation modeling for application as management decision making. It also considers the types and methods of application of simulation models at the enterprise. Algorithms and programs that allow you to determine the behavior of the system in different conditions and when changing parameters to create the most accurate model are considered.

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*L.A. Verentsov, M.V. Burmeister, D.V. Statsenko, E.A. Malenkova*

### **Assessment of Equivalent Inertia in an EPS with a Significant Share of RES**

*Keywords:* system stability; inertia; power system; inverter; renewable energy sources; frequency control.

*Abstract.* An increase in the volume of generation based on renewable energy sources (**RES**) connected to the electric power system (**EPS**) through inverters worsens the stability conditions and reduces the reliability of the power system. Inertia in the EPS is determined taking into account all rotating masses. Thus, with an increase in the number of renewable energy-based power plants (excluding hydroelectric power plants), the equivalent inertia of the system does not increase due to the lack of rotating masses of these objects connected to the EPS using power inverters. The purpose of this study is to determine the equivalent inertia of the EPS, taking into account the inertia from renewable energy-based power plants using virtual inertia systems (**SVI**).

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*L.A. Verentsov, M.V. Burmeister, D.V. Statsenko, A.A. Khorkina*

### **Creating a Simulation Model of a Solar Power Plant Power Inverter with Modern Renewable Energy Integration Mechanisms**

*Keywords:* renewable energy sources; solar power plant; power inverter; automatic control system; voltage maintenance.

*Abstract.* In recent years, the pace of construction and commissioning of solar power plants (**SPP**) has increased significantly. These generation facilities are connected to the electric power system (**EPS**) using power converters – inverters. Due to the significant increase in the share of SPP in the global structure of electricity generation, new requirements were introduced regulating the operation mode of power inverters installed on SPP in case of external disturbances in the EPS. The purpose of this study is to develop a simulation model that allows the most accurate simulation of the operation of the SPP under external disturbances in the EPS, corresponding to the basic regulatory requirements. In this article, an inverter model has been developed that takes into account LVRT and Q(U) characteristics when reducing

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the voltage in the point of common connection. The study of the operating modes in the presented model will allow us to develop recommendations for setting the parameters of the inverter to improve stability under external disturbances in the EPS.

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*A.A. Gladkov, A.P. Bagaeva, I.A. Pinchuk*

### **Analysis of Decision Support Systems in Company Management**

*Keywords:* IT projects; analytics; enterprise operations; decision making; information systems.

*Abstract.* This paper considers the basics of modern information systems that are used in the enterprise to support decision-making. The characteristics and features of the systems that such systems should have been considered. The main problem of IS selection for the enterprise is their diversity in the market. The choice of the system depends on how actively the user participates in the decision-making process and how much the system takes into account his preferences and needs.

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*A.V. Gorelik, P.A. Nevarov, P.V. Savchenko, N.V. Romanov*

### **Ways to Improve the Technical Operation of Railway Automation Systems Based on Benchmarking Technology**

*Keywords:* benchmarking; railway automation and telemechanics; resource; Signalling block system; maintenance; technical condition; operation; outsourcing.

*Abstract.* The article discusses ways to improve the technical operation of railway automation systems based on data obtained using benchmarking technology. Based on the data obtained, four priority directions for optimizing the main processes of the automation and telemechanics economy have been identified. Various methods of increasing the efficiency of technical operation are proposed, such as outsourcing, life cycle contract, transition to low-maintenance equipment, maintenance according to technical condition. The authors concluded that a competent combination of these methods will significantly increase the economic efficiency of the automation and telemechanics economy.

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*K.A. Kryshko, A.M. Gazizov, M.G. Bashirov, R.R. Mustafina*

### **A Digital Twin for a Training Laboratory Installation to Study Methods and Means of Control and Pressure Regulation**

*Keywords:* genetic algorithm; intelligent tool; process improvement; ethylene production; catalyst.

*Abstract.* The aim of the paper is to develop a genetic algorithm as a tool for optimizing the model for assessing the state of the acetylene hydrogenation catalyst. The genetic algorithm refers to intelligent tools, the development and application of which is an urgent task. Real-time assessment of the state of the acetylene hydrogenation catalyst makes it possible to optimize the ethylene production process. As a result, a genetic algorithm was developed in the Python programming language.

### **Generative Adversary Networks in the Field of Information Security**

*Keywords:* generative adversarial networks; fake images; information security; generation.

*Abstract.* The paper examines the potential use of generative adversarial networks (GANs) to improve the security of systems that rely on images as a primary security feature. By generating both real and fake images, GANs help train the system to become more resilient to attempts by attackers to exploit the system. Describes how a generator can create fake images that look the same as real images, and then use a discriminator to distinguish between real and fake images. It is noted that the creation of a more complete training data set will lead to increased efficiency in detecting security anomalies. It is concluded that GAN networks have a high potential for improving the security of image-based systems in preventing unauthorized access to sensitive data.

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T.A. Kovalenko, A.N. Leutina

### **Information Technology Offences**

*Keywords:* cybercrime; computer fraud; hacking; hacking; information protection; copyright infringement; online terrorism; cyber espionage.

*Abstract.* The goal is analysis, research and assessment of the causes of crime. The research hypothesis is as follows: effective measures to prevent and combat crime in the field of information technology can only be developed on the basis of an integrated approach. The study used methods for analyzing statistical data and expert assessments to identify dependencies between various attack tools. As a result, recommendations have been developed to create effective crime prevention strategies.

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K.V. Skvortsov, A.N. Iskandaryan, A.B. Lukhter

### **Man in Modern Digital Reality**

*Keywords:* reality of everyday life; digital reality; digitalization; on-line education; artificial intelligence.

*Abstract.* The article discusses various aspects of human integration into contemporary digital society, including the use of digital devices and technologies in everyday life, access to information, digital skills and competencies, as well as interaction with other actors in the digital environment. With the development and implementation of artificial intelligence, new challenges and opportunities arise for humans, related to automation, big data analysis, and decision-making based on algorithms. The aim of this research is to conduct a detailed analysis of the process of human integration into the modern digital environment. The main objectives of the research are to search for and examine specific examples that demonstrate the widespread use and application of artificial intelligence, as well as to analyze the consequences of its integration into various spheres of human life. The hypothesis underlying this study is that in the near future, the use of artificial intelligence systems will lead to qualitative changes in all aspects of human activity. Using methods such as analysis and theoretical examination of available literary sources, the authors have concluded that there is an urgent need to develop legal and ethical principles to regulate the use of artificial intelligence.

### **Using Artificial Neural Networks to Create an Intelligent Information Network**

*Keywords:* artificial neural networks; information network; creation; use; efficiency; problems.

*Abstract.* The article discusses issues related to the use of artificial neural networks to create an intelligent information network. The purpose of the study is to study the use of artificial neural networks to create an intelligent information network. The main research methods: the method of analysis, comparison, decision-making, logical reasoning and many others. The author of the article emphasizes the importance of using artificial neural networks to solve various tasks in various spheres of society. The definition of the concept of "neural networks" is studied. The participants of this process have been identified, as well as the necessary conditions for the implementation of information interaction. The difference between intelligent systems and conventional software systems is considered. The definition of the concept of "intelligent information systems" is studied. The creation of an intelligent information network based on the use of TensorFlow technology has been studied. The creation of an intelligent information network based on the use of Data Mining technology has been studied. The stages of information activity of using this technology are considered. The use of the information product of the Deductor platform for the creation of an intelligent information network, as well as its advantages of application, has been studied. The main components of this platform are considered. The main directions of increasing the efficiency of using neural networks for decision-making and their further evaluation have been developed. Purpose: The purpose of the study is to study the use of artificial neural networks to create an intelligent information network. Methods: Basic research methods: the method of analysis, comparison, decision-making, logical reasoning and many others. Results: The issues of using artificial neural networks to create an intelligent information network have been studied. The main directions of increasing the efficiency of using neural networks for decision-making and their further evaluation have been developed. It is concluded that the use of artificial neural networks to create an intelligent information network is of great national and economic importance. Neural networks allow you to accumulate information, extract it and use it at the right time, transfer it from one subject to another. Using a neural network, an economic entity (user) gets the opportunity to establish direct (individual) contact with another entity, which in turn allows taking into account his personal characteristics, academic performance, as well as requests and needs. The presence of feedback makes the process effective and encourages the search for permanent contact. It should be noted that the use of neural networks to create an information network also has educational value. So, for example, there is a common interest in achieving the set goal and the tasks to be solved, conducting scientific research or studying certain issues of the subject. All this makes it possible to unite the participants in the process, strengthen their relationships.

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*L.A. Verentsov, M.V. Burmeister, D.V. Statsenko, E.A. Malenkova*

### **Methods of Frequency Control by Solar and Wind Power Plants**

*Keywords:* renewable energy sources; inverter; automatic control system; supercapacitor; frequency control.

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*Abstract.* A significant increase in the share of generation based on renewable energy sources (**RES**) leads to a deterioration in the stability conditions and reliability indicators of the electric power system (**EPS**). In order to maintain the frequency within the permissible regulatory limits, it is necessary to ensure a power balance in the EPS both in normal modes and in the event of external disturbances. The purpose of this study is to determine the most effective method of frequency control by solar power plants (**SPP**) and wind power plants (**WPP**). The implementation of a set of technological measures will increase the stability of the EPS in the event of external disturbances. This article presents the most common methods of frequency control using SES and wind turbines. The choice of the most effective method of frequency control was carried out taking into account the economic characteristics of renewable energy facilities.

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*I.S. Zharov*

### **Calculation of the Static Characteristics of the Maximum Air Flow Sensor with a Flat Elastic Sensing Element**

*Keywords:* maximum air flow sensors; elastic sensing elements; springs.

*Abstract.* In this article, the displacement of a flat elastic sensing element of the maximum air flow sensor is calculated, while for the possibility of using a diagram of elastic parameters, the distributed load acting on the spring under the action of air is replaced by a concentrated force applied at the end of the spring. A static characteristic of the maximum air flow sensor with a flat elastic sensing element is constructed (the dependence of the peak velocity on the force, vertical and horizontal movement of the spring). It is revealed that the static characteristic can be divided into three sections close to linear: from 0 to 200 l/min; from 200 l/min to 500 l/min; from 500 l/min to 700 l/min. At the same time, in the area from 500 l/min to 700 l/min, the sensitivity is minimal, therefore, it is advisable to use a maximum air flow sensor with a flat spring to measure peak speed up to 500 l/min. The calculations carried out and the static characteristic obtained made it possible to obtain an engineering methodology for designing maximum air flow sensors to achieve the greatest sensitivity, and therefore contribute to improving the reliability and accuracy of measurements.

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*I.A. Alexandrov, A.N. Muranov, S.A. Sheptunov, V.Zh. Kuklin*

### **Specificity of Group Intermittent Flow Lines Designing**

*Keywords:* production lines; groups of parts; modeling; processing of parts.

*Abstract.* An important production task is to reduce production costs by increasing the efficiency of work processes. For this purpose, among other things, group production lines are used, which reduce time costs. The purpose of this work is to consider approaches to the optimal grouping of parts when combining them into groups in production. The issues of mathematical modeling and optimization of technological processes for processing parts within group production lines are considered. The calculation and comparison of the minimum total costs for equipment changeovers and work in progress for production line options with and without combining parts into groups is presented. It is noted which operations of the group technological process need to be given priority attention in order to reduce the duration of the processing cycle for a group of parts. It is shown that the properties of the defining path of parts allow for targeted improvement of group technological processes.

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*M.G. Kazanov, N.D. Dyuldin*

### **Energy Efficiency of an Electric Drive under Conditions of Frequency Drive and Artificial Intelligence**

*Keywords:* energy efficiency; frequency-controlled electric drive; artificial intelligence.

*Abstract.* The purpose of this article is to point out modern ways to achieve energy efficiency in the design and optimization of electric drives. The hypothesis of the study is to confirm that with the correct application of all recommendations, the goals will be achieved. Scientific methods used in this article: analysis, generalization. In the course of this work, special attention was paid to specifying the conditions and requirements necessary to create efficient electric drives.

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*I.A. Pogrebnaya, S.V. Mikhailova*

### **Increasing the Wear Resistance of Machine Parts by Magnetic Treatment**

*Keywords:* machine parts; magnetic pulse processing; structural materials; magnetic field.

*Abstract.* The purpose of the study is: the effect of magnetic pulse processing on the operational properties – wear resistance and durability of parts of various assemblies, machines, complexes. The research method is based on the use of a combined effect of magnetic fields on a machine-building structure. The behavior of parts under the influence of strong magnetic fields is described. Result: the main advantages of the behavior of the processed material under the influence of a magnetic flux are determined. It is concluded that the use of magnetic influence on structural materials is considered a progressive method that determines a number of advantages over other influences. This method allows you to change the structure of the metal itself, and consequently, its physical and mechanical properties, which allows you to improve the performance characteristics not only of parts, but also of the product as a whole.

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*Sun Tianyu*

### **Using Laser Processing Methods to Process Micro-Holes of Fuel Injectors**

*Keywords:* laser processing; mechanical engineering; nozzles; micro-holes.

*Abstract.* This article is devoted to the study and application of laser processing methods for processing micro-holes of fuel injectors. The aim of the study is to develop an effective method for processing micro-holes, which will improve the operation of fuel injectors and increase the efficiency of fuel combustion. The objectives of the article are analysis of existing methods for processing micro-holes of fuel injectors, determination of the advantages and disadvantages of each method, development and optimization of the laser method for processing micro-holes. General scientific research methods were used in the paper. As a result of the study, it was found that laser treatment is an effective method for processing micro-holes of fuel injectors. This method allows you to accurately control the depth and diameter of the holes, as well as their shape, which affects the quality of fuel spraying and, accordingly, the combustion efficiency.

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*A.V. Chernova*

### **Analysis of Methods of Molecular Identification of Fish Species**

*Keywords:* molecular identification; DNA sequencing.

*Abstract.* The sale of counterfeit fish products has become a big problem for both consumers and supervisory authorities. The use of methods of molecular identification of fish species helps to detect and avoid intentional, as well as unintentional replacement of various fish species. The aim of the work is to analyze widely used methods for identifying fish species based on DNA analysis. These methods have a number of advantages over ELISA methods and complement traditional methods of morphological identification.

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*R.G. Guchel*

### **Study of the Current State Level of Quality of Life of the Population of the Tambov Region**

*Keywords:* quality of life of the population; demographic indicators; socio-economic development; economic security of the region.

*Abstract.* The article presents the current state, main indicators and problems of improving the quality of life of the population of the Tambov region. The purpose of the article is to assess the level of quality of life of the population. The objective of the study is to conduct a study of the level of quality of life in society based on an analysis of indicators of socio-economic security of the population, demographic indicators, as well as proposing measures to solve problems in the field of quality of the population of the region.

The main hypothesis of the study is that problems of improving the quality of life are a priority; economic and social stability in society depends on their solution. The research methodology is scientific search, generalization, analysis, systematization. The results of the study showed that the analysis of socio-economic indicators allows us to develop and identify problems in the sphere of quality of life of the population of the Tambov region, and develop measures to solve them. All indicators of the quality of life of the population are interconnected, a change in one will entail a change in the other.

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*E.V. Kostoustova, I.V. Shadrina, L.N. Ridel, T.V. Dubrovskaya*

### **Technologies for Increasing the Profitability of Hard-To-Recover Oil**

*Keywords:* hard-to-recover oil reserves; digital twin; investments; financial costs; profitability; intelligent field; digital technologies.

*Abstract.* The issues of digitalization of the oil and gas industry in the field of hard-to-recover resources are considered. The basic concepts within the framework of the topic are given, the relevance of the introduction of digital technologies to increase the potential of the field and increase the profitability of resource extraction is substantiated. The methods of analysis and comparison were used in the study. The formulated conclusions will be used in further works.

### **Problems and Prospects of Advertising Business Development**

*Keywords:* advertising business; advertising industry; competition; technology; digital advertising; mobile advertising; social networks; instability of the advertising market; personalization; content marketing; analytics; efficiency; innovation.

*Abstract.* The advertising business is an important part of the modern economy, but it faces a number of problems related to changes in consumer behavior, technological shifts and regulatory restrictions. Advertising is a dynamic and rapidly developing industry, but modern challenges and changes in consumer behavior pose serious obstacles to its effective functioning. This article discusses the main problems faced by the advertising business, as well as development prospects, including innovations and new approaches to advertising communication.

Problems and prospects for the development of the advertising business are important topics for research.

Goals and objectives of the study include studying the current problems faced by advertising companies; determining the prospects for the development of the advertising business; analyzing trends and innovations in the advertising industry; studying the impact of new technologies on the advertising business; evaluating the effectiveness of various advertising strategies and channels.

Research hypotheses are as follows.

1. The introduction of new technologies and digital platforms will continue to change the advertising business, creating new opportunities and causing development problems.

2. Personalization and targeting will become increasingly important in the advertising business, as consumers expect an individual approach and relevant advertising.

3. The growth in the use of mobile devices and social networks will have a significant impact on the advertising business, requiring the adaptation of advertising strategies and formats.

4. The emergence of new advertising formats, such as influencer marketing, branded content advertising and programmatic advertising, will create new opportunities for advertising companies.

The research methods are the analysis of current research, articles and publications related to the problems and prospects of the development of the advertising business; data collection through surveys, interviews with representatives of advertising companies; analyzing and processing data obtained by statistical methods to identify the main trends and patterns; the comparative analysis of various advertising strategies, channels and formats to assess their effectiveness and applicability in various situations.

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T.M. Redkina, I.P. Firova, V.V. Pogodina

### **A New Vector of Ensuring the Economic Security of the Russian Federation**

*Keywords:* special military operation; beneficiary cities; activation of consumer demand; state budget; economic security of the Russian Federation.

*Abstract.* The purpose of the paper is to substantiate the directions forming the economic security of the country in the conditions of increasing restrictions from the external environment. To achieve this goal, the following tasks were identified: the most significant factors influencing economic security in the current conditions were identified; the reasons for the failure to achieve forecast indicators were identified; directions for further improvement of the process of ensuring economic security of the Russian Federation were proposed. The hypothesis of the study is manifested in the substantiation of



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proposals for the revision of existing approaches to overcoming geopolitical risks that determine the vector of implementation of measures ensuring the economic security of the Russian Federation. Such scientific research methods as analysis and synthesis, hypothetical, hypothetical-deductive have been used in the work. The achieved results consist in the formation of decisions aimed at revising the state's policy in the field of economic security.

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*O.V. Sorvina, T.N. Kuleshova*

### **Development of an Approach for Using Express Scoring of Projects to Determine an Individual Acceleration Trajectory**

*Keywords:* acceleration; project; business-project; capital investment; mentoring; project diagnostics; express scoring.

*Abstract.* The purpose of this article is to develop a methodology for express analysis of projects to determine an individual acceleration trajectory. To achieve this goal, such tasks were set and completed: consideration of aspects of supporting acceleration programs, analysis of the essence, necessity and principles of diagnosing projects, identification of stages of project development at which it is advisable to conduct a scoring assessment of projects, assessment of the project in a number of sections, assigning weight to each, the development and analysis of a project scoring map, construction of visualization of scoring results. As a result of the study, the parameters by which the assessment will be carried out, their weighting coefficients were identified, a scoring card was developed and an example of a project analysis using it was shown.

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*A.P. Bagaeva, A.A. Gladkov, Ya.V. Zhilkina*

### **Decision-making Process at the Enterprise as an Organizational Management Process**

*Keywords:* acceleration; project; business-project; capital investment; mentoring; project diagnostics; express scoring.

*Abstract.* The purpose of this article is to develop a methodology for express analysis of projects to determine an individual acceleration trajectory. To achieve this goal, such tasks were set and completed: consideration of aspects of supporting acceleration programs, analysis of the essence, necessity and principles of diagnosing projects, identification of stages of project development at which it is advisable to conduct a scoring assessment of projects, assessment of the project in a number of sections, assigning weight to each, the development and analysis of a project scoring map, construction of visualization of scoring results. As a result of the study, the parameters by which the assessment will be carried out, their weighting coefficients were identified, a scoring card was developed and an example of a project analysis using it was shown.

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*Yuelong Zhang*

### **Factor Analysis of the Impact of the New BRICS Expansion on Global Economic Security**

*Keywords:* BRICS; investment; oil; market; sanctions; trade; currency; economy.

*Abstract.* The article deals with topical issues related to the prospects of the BRICS alliance and the dynamics of the global economy. The aim of the article: to conduct a factor analysis of the impact

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of the new BRICS expansion on global economic security. The objectives are to consider the prospects of reorientation of global trade and investment; to study the impact of the BRICS common currency on the dominance of the dollar in international settlements and reserves; to outline the impact of the BRICS on balancing the energy market. The hypothesis is as follows: the BRICS expansion has a bidirectional impact on the world economy, creating great opportunities for its development and initiating new risks. The research methods are systematization, analysis, forecasting, comparison, and generalization. The results are as follows: the enlarged BRICS has great potential to support global growth and ensure stable economic development. At the same time, attention should be paid to such challenges to the international economy as the volatility of financial markets when introducing the BRICS common currency.