ABSTRACT&REFERENCES

CONTROL SYSTEMS

PROSPECTS OF LOGISTIC INDUSTRIAL COMPLEXES IN UKRAINE (p. 4-9)

Iryne Morozova, Maya Perepichko

The purpose of the article is to identify the concept of "industrial park", to determine the distinctive features of industrial parks from other parks, to form a systemic view of the object and to assess the prospects of industrial parks in our country. We had to define the notion of the industrial park and its differences from other parks. To this end, the article analyzes the definitions of different authors and provides a conclusion: the difference is determined by the dominance of one of the components in the functional purpose of the park. On the basis of the results of the analysis of the various definitions and main provisions of the law of Ukraine "On the industrial parks" (registration number 8396) the systematic concept of the industrial park was formed. Experience in the creation of certain industrial parks in Ukraine cannot be considered a success. The reasons are a bad choice of location, the lack of a proper amount of design studies and a low level of management. A prospective direction in the creation of industrial parks in Ukraine is believed to be the use of the port area

Keywords: industrial park, seaport, logistics services, innovation centers, port system

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INVARIANTS AND FIRST INTEGRALS FOR A SPECIAL CASE OF A CONTROLLED PROCESS IN AN ACTIVE AVIATION SYSTEM (p. 10-13)

Vladimir Kasianov, Andriy Goncharenko

In this work it has been found Hamiltonians for the theoretically considered, one of the simplest particular cases of a variational problem of control in an active aviation system acting in conditions of multi-alternativeness and conflicts.

The presented researches have been performed for a case when the independent variable, that is time, is not present in the functionals explicitly.

The entropies of the functionals are different, even if they have the same formal view of notation, because they include different preferences functions which contain different effectiveness functions. The considered, in these researches, particular cases are derived from the general view functional with the cognitive function of the general form for the studied eleven special cases.

The sought conserved values have been found, and they are the Hamiltonians which is theoretically substantiated and stipulated by the absence of the independent variable in the functionals in the explicit view.

It is fulfilled the mathematical modeling with the Hamiltonian in the special case for the obtained with the help of the Euler-Lagrange equations the canonical distributions of the individual preferences for the given functionals; the differential equations of the second order for finding extremals of the controlling functions of the functionals. Plotted corresponding diagrams

Keywords: Hamiltonian, constant, multi-alternativeness, conflict, safety, functional, preference, entropy, variation

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RATIONALIZATION TECHNOLOGIES OF GRAIN TRANSPORTATION (p. 13-15)

Viktor Nefedov, Julia Tkachenko

The task to improve the technology of grain transportation is given. Having analysed all the approaches given in the scientific sources the method of transshipment using a compensator is proposed, which means the technology where a number of grain harvester combines is moving on the field to the point of unloading and where a track- truck that is a transfer is waiting. In the point of unloading the grain contained in the combines is transshipped into a transfer, which is after being loaded is further taken to the edge of the field and then this grain is transshipped into the vehicles. The usage of compensators allows the combines to be unloaded immediately after filling a hopper and the vehicles to be loaded after arriving on the field, such compensators as transfers solve the problem of soil consolidation by the vehicles of high load – carrying capacity which is effective at grain transportation. Using Newton's method the optimum values of the model parameters due to which the minimization of the aim function is achieved are defined. The mathematical model of grain transportation was received. Optimization results in minimum time expenditure to gather the grain achieved at the 9 meters width of a harvesting machine, 10 ton load-carrying capacity and 37 kph technical speed

Keywords: grain transportation, compensator, technology, technological chain, harvester, crop, field area

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REENGINEERING OF PURCHASES PLANNING BUSINESS PROCESSES FOR RESTAURANT BUSINESS ENTERPRISES (p. 16-19)

Larisa Zagorovska, Natalia Brovchenko, Oleksandr Kovtun, Lyudmyla Antseburova

The article is devoted to the study of business processes of purchase planning of restaurant businesses to identify disadvantages and ways of their improvement. In the BPwin environment using structural analysis and design we developed the functional model «AS-IS» for display and analysis of the existing sequence of business processes.

The analysis results revealed a number of disadvantages in purchase planning and the ways of their improvement, which were reflected in the model «TO-BE» as a result of reengineering.

The measures of the business process reengineering of purchase intend to weaken the influence of human factors on the formation of product orders, and to monitor the planning process, ensuring restaurants the reliable and timely supply of quality products in the right quantity and assortment. Only usage of the modern methods of business process automation makes it possible to leave competitors far behind and create unique competitive advantages

Keywords: business process, functional design, diagram, activity, purchase planning, analysis, reengineering

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MODELING OF EFFECT OF TOPOLOGICAL STRUCTURE ON CHARACTERISTICS OF SPIKE NEURAL NETWORK (p. 19-21)

Anatoliy Shiyan, Viktoria Ivanenko

Despite the active study of the spike neural networks, little attention has been paid to the effect of the topological organization of such networks on the efficiency of information transformation. This article proposed an approach to modeling the effects of the neural network topology on the behavior of a spike neuron, which makes it possible to evaluate the effectiveness of information transformation. To do this, the notion of a set of ways of distribution of spike signal through the neural network was introduced. The models are constructed to describe the effect of the neural network topology on a detached neuron for the two cases. It was shown that the spike neural network has both minimum and maximum sizes, which depend on the characteristics of the network, as well as on the specificity of the operation of the spike neuron. The results provide new ways for explaining the functioning of the natural neural networks and for building the effective artificial neural networks (e.g. for pattern recognition, or for managing technical objects).

Keywords: spike, neural network, topology, way, data processing, distribution, receptor motoneuron

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MODELING OF DEMAND ON PASSENGER TRANSPORT SERVICE DURING THE PUBLIC EVENTS ARE BEING HELD (p. 22-25)

Alexander Rossolov, Evgeny Lubyi, Vladislav Korol, Elena Levchenko

Development of correct methods of passenger servicing on the route network in big cities during public events is becoming more urgent with each passing year. The reason for this is an increase in amount of cultural events of both Ukrainian and European level. Thus, not quite adequate measures concerning organization of the urban passenger transport functioning are sometimes taken, which causes overspendings by carriers and city authorities. The projected level of reliability and quality of service leads to overestimation of the number of rolling stock, incorrect route location and inefficient organization of interaction of various types of urban transport in transport hubs. One way of solving this problem is correct simulation of demand for urban passenger transport service during public events. The key issue in this field is to determine an O-D matrix. A new approach to an O-D matrix stratification and simulation of each type of travel has been suggested in the work. Special attention is paid to studying of the problem of

determination of transport areas departure and arrival capacity, first of all, for cultural and general trips. The relationship of formation of correspondences implemented using the urban transport as well as the individual one has been determined. By means of mathematic simulation, a demand model giving the information about the level of loading of the route network by passenger flows has been constructed.

It has been estimated that the level of passenger correspondences is increasing during the public events

Keywords: correspondence of passengers, public events, origin-destination matrix, transport area capacity

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POSSIBILITY OF AUTOMATION PROJECT MANAGEMENT USE FOR CONDITIONS OF AGRICULTURAL PRODUCTION (p. 26-29)

Vasily Tymochko, Roman Padyuka

Project management in agriculture has a number of features that are not captured by existing systems of project management. During planning of farm portfolio it is important the distribution of land resources between different projects. It is necessary to research the features of inputs use in depending on the scale of the project portfolio, enabling assessment of the feasibility portfolio on the criterion of sufficiency of inputs (tractors, agricultural machinery, automobiles, etc.). In Western systemsof project management (MS Project and Primavera) there is no such thing as a scope of work, making it impossible to portfolio planning in agriculture from the scope of work - namely, the area of a given crop in the portfolio of projects. Works in agricultural production should be carried out in certain agronomic terms which are defined by biological characteristics of crops and types of work.

Temporal performance of work is not appropriate, and agronomic performance over time leads to the non-renewable product loss at project.

Therefore, an important task is to determine the resources necessary for performance of the project in accordance with the specified farming terms. It uses an indicator such as hourly productivity of the resource. Possibility of this indicator setting, as well as to standards and technical resources is available in the package Spider Project

Keywords: system of project management, Microsoft Project, Primavera, Spider Project, agricultural production

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DEVELOPMENT OF PROPOSALS FOR THE ESTABLISHMENT OF TRANSPORT-LOGISTIC CLUSTERS KHARKIV REGION (p. 29-33)

Evgeny Alyoshinsky, Ekaterina Belan

In order to improve the transport system in the Kharkiv region the transport and logistics cluster is being created. Based on global experience of implementation of the cluster policies the models of cluster formation were analyzed. The conducted SWOT-analysis allowed the hypothesis that Italian model of the cluster policy is the most appropriate for the Kharkiv region. The article presents the main stages of formation of transport and logistics cluster that will clearly organize the activity of its members, to identify the main priorities in their work. Transport and logistics industry plays an important role in our country and therefore the formation of transport and logistics cluster is important for both regional and national economy. The suggested model of industrial relations, namely the creation of transport and logistics cluster will improve living standards, increase business competitiveness, the integrated use of resources and scientific potential. Economic efficiency of the cluster consists in an integrated approach, where each spent unit has a significant increase in profit, more than that obtained when each company operating separately

Keywords: transportation system, transport and logistics cluster, cluster models

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QUALITY CONTROL OF THE LEATHER SEMI-FINISHED PRODUCT AT THE TANNING STAGE (p. 34-36)

Anna Himicheva, Galina Golosna

The modern production of leather is characterized by a high level of mechanization of labor, availability of automated equipment, chemical materials, which improve leather quality and significantly accelerate the progress of the technological processes. Currently, there is a special need for intensification of production by improving the production technology. One of the most important processes of leather production, which affects the quality of the finished product, is tanning. The objective of the research is to study the methods and parameters to determine the quality of the leather semi-finished product at the tanning stage. The study provided an algorithm that helps to prevent various defects at each stage of the technological process. Continuous monitoring of physicochemical characteristics permits to prevent the ingress of defective products to the final consumer. The research results are useful for producers of leather

Keywords: chrome tanning, influencing factors, evaluation of quality, control parameters

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METHODOLOGY OF LONG-TERM FORECASTING OF AMOUNTS OF WORKS PERFORMED BY TRANSPORT SECTOR (p. 37-40)

Tatyana Samisco

The article studies the dynamics of transport sector as the characteristics of the country's transport system components. The methods of the research include the historical method when determining the stages of formation and development of the transport infrastructure of the country; the method of system analysis when determining the components of transport system and analyzing the existing approaches to forecasting conditions and parameters of the system; the mathematical modeling when predicting the characteristics of the components of the transport system of the country. Based on improvement of scientific approaches for long-term forecasting of characteristics of the components of transport system of the country a method of forecasting of the volume of work performed by the transport sector was developed. It was found that forecasting of the studied characteristics should be carried out in two stages. At the first stage, we use the growth rate in the middle of the stage and the ratio between the increments of first periods of the closed state and first periods of the open state of II and III stages, and forecast the initial and final values of the characteristics in different periods of existence of transport system. At the second stage, we use the mathematical model of the system in the closed state, and find the numerical values of the characteristics within periods

Keywords: methodology, forecasting, parameter, state, volume of work, transport sector, mathematical model

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SOLVING SOME INFINITE-DIMENSIONAL PROBLEMS OF ENTERPRISES ARRANGEMENT (p. 40-45)

Maryna Sazonova

There are a lot of publications devoted to infinite-dimensional transportation problems, or (more common) to infinite-dimensional problems of enterprises arrangement with simultaneous division of the region on consumers' regions, each served by one enterprise, in order to minimize transportation and production costs. As consumers, there may be telephone, radio, TV users, students, voters, irrigated areas, patients for diagnosis and many other practically important problems. However, little attention was paid to the account of the nonlinearity of the functional of total production and transportation costs. This article presents practical production and economic problems, which were first studied in such an arrangement that allows more adequate simulation of real processes mentioned. To solve the infinite-dimensional nonlinear problems of enterprises arrangement we offered their construction in a mathematical formulation to continuous nonlinear problems of optimal division of sets with arrangement of centers of subsets with constraints in form of equalities and inequalities, and applied previously proposed by the author methods and algorithms and software implementation of NZORM. Using NZORM, we obtained numerical solutions and graphical visualization of the results of these problems

Keywords: infinite-dimensional problems, problems of enterprise arrangement, optimal division of sets

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JUSTIFICATION OF SELECTION AND ORGANIZATION OF TRAIN-FORMING SYSTEM. THEORETICAL BACKGROUND (p. 46-49)

Oksana Kovalova

Taking into account the development of the control system of a rolling stock, the article discusses the problems related to the executions of orders of cargo owners as to the formation of trains with the requirements necessary for high-quality and efficient performance of transportation of the required range of goods. It was suggested to consider the railway yard on the example of railway administration of transportation as a graph that is not focused and equipped. Based on the graph, and based on technical condition, availability and amount of loading resources in the areas of accumulation of empty rolling stock we state the possible variants for the execution of orders for a load, such as the order was executed roughly, or it was made better or worse than it should have. Thus, the notion "the order was executed no worse than" was defined. The results obtained theoretically justify the choice for execution of an order of a cargo owner for a load

Keywords: rolling stock, point of accumulation, point of formation, train-forming order

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NEURO-FUZZY CONTROL PRECISION AND STABILITY OF PROCESS MACHINING (p. 49-53)

Natalia Zubretskaya

The abstract presents the results of research and grounds the application of neuro-fuzzy approach to control of accuracy and stability indices of technological processes according to the suggested multicriteria prognostication of the industrial product quality.It was shown that under stochastic uncertainty of information about the process for the high quality of manufactured goods, it is necessary to use simultaneously the straight-grained prognostic neural network models and fuzzy inference, based on piecewise linear membership functions with the least error of data conversion. The integrated study and obtained results of simulation modeling provided that the application of suggested complex adaptive model of control system allows getting the required accuracy of the quality characteristic of product manufacturing irrespective of indices of parameters of law of its static distribution and temporal changes

Keywords: neuro-fuzzy control, prognostication, accuracy, stability, technological process, mechanical procedures

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RAILWAY BORDER STATIONS WITHIN CLUSTERS TRANSPORT AND LOGISTICS (p. 53-58)

Yulia Shuldiner

The article justifies the feasibility of improvement of the functioning of the information subsystem of the border transfer station as a member of the transport and logistics cluster of the competitive region. The study is dedicated to the task of improvement of the functioning of the information subsystem of the border transfer stations. It helped to identify the most problematic areas in the operation and interaction of transfer stations of freight cars flow in international traffic. In order to determine the rational parameters of the transfer system the model of the information subsystem of border transfer station with the uncertainty of the production situation was worked out. It includes a range of measures to improve the technology of the border transfer stations. The measures of rationalization of the interaction of two adjacent stations permit to minimize the number of detained cars and reduce the time for freight flow processing traffic by the control authorities. Based on the technology of reproduction of operation of a border transfer station it was revealed that according to the modeling results the greatest impact on the rate of transfer of cars flow abroad has unproductive downtime of cars related to customs and other technological operations that occur during the processing of railway information

Keywords: international traffic, information subsystem, border crossing stations, transport and logistics cluster

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METHODS TO ENSURE STABILITY OF CONTROL SYSTEMS BASED ON PI AND PID CONTROLLERS (p. 58-63)

Yuri Kovryho, Taras Bahan, Olexander Bunke

In the real operation of automation systems, there is not a model that would describe without simplifications the behavior of the control object. Most technological objects are described by complex differential equations that cannot in practice precisely adjust a regulator, and can only get approximate parameters. The purpose of the research is a synthesis of the regulator, which would provide the set parameters of transient processes, irrespective of model errors or changes of equipment parameters during the process. The article proposes the method of dynamic adjustment, which uses 2-channel structure: the main channel is responsible for system performance and the channel of adjustment compensates the excessive signal of the control effect, ensuring the sustainability of ACP in the final section of the transient process, which allows using the forced adjustments of the main channel. The advantages of the regulator with internal structure are considered, the stability of closed-loop system is achieved by selecting a resistant IC regulator. As an estimation of an error of the adjustment, the H ∞-norm was taken. In a system with the IMC-H ∞ regulator the performance of transients are directly dependent on the parameters of the regulator, which makes its adjustment very easy-to-use. The article proposed structural and algorithmic solutions for provision of a given operation quality of control systems. On the example of ACP of temperature of pulverized air-mixture, we conducted simulation and comparative analysis of the main indicators of quality of functioning of regulators. The use of these techniques allows sufficient stability while maintaining performance and other indicators of quality of the system operation throughout the operating range of load of the control object

Keywords: control, regulator, stability, robustness, automation, dynamic adjustment, IMC

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ANALYSIS OF NON-UNIFORMITY OF DEPARTURE OF TRAINS FROM TECHNICAL STATIONS ON RAILWAY DIRECTION (p. 63-66)

Roman Vernigora, Lidiya Yelnikova

In order to improve the quality of transportation and to speed up the freight de-livery it is proposed to create an adaptive system

of operational management of en-gine yard to reduce unproductive downtime of trains while expecting locomotives and locomotive crews at technical railway stations in Ukraine. One of the important com-ponents of the input data to solve the problem of rational distribution of locomotives and locomotive crews is the duration of movement of trains at stations.

The study as to identification of the relationship between the number of cars shipped from the railway technical stations and the duration of movement at stations showed the close relationship between these parameters.

The analysis of seasonal, weekly, and daily unevenness permits to predict the number of trains that will be sent in a particular day of a week and at any time of a day. This allows you to determine the number of locomotives and locomotive crews for operational support of trains ready for depar-ture, that will make it possible to reduce unproductive downtime of freight trains ex-pecting locomotives and locomotive crews, which in turn will accelerate the speed of delivery and improve the competitiveness of the railways of Ukraine at the freight market

Keywords: inequality of departure of trains, number of departed trains, duration of movement at a station, locomotives, locomotive crews

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EFFECT OF CHANGES IN THE FUNCTIONAL STATE OF THE DRIVER ON ROAD SAFETY (p. 67-69)

Nizami Gyulev, Victor Dolya, Maxim Bichev

The technology of traffic organization provides the safe and smooth operation of the whole transport system of a city. The main element of this system is a driver, on the strategy of behavior of which depends the safety of the system.

Traffic jams arising from the use of wrong technology of traffic organization or because of excessive traffic on the road, lead to a change in the functional state of drivers. For some groups of drivers, such as the cholerics and sanguines, these changes lead to a deterioration in their functional state. The article presents and systematizes the model of changes in the functional state of all major groups of drivers of different temperaments. At the same time it stresses that one of the negative factors of violation of traffic organization is the traffic jam. Also, it presents the model, which establishes the relationship between the driver's reaction time and its functional state. Models of changes in the reaction time for a driver-choleric and a driver-sanguine make it possible to predict their reaction time, depending on duration of their stay in the traffic jam. It is emphasized that the effects of traffic jams for those drivers as a change in their reaction time largely determine the road safety in general. Moreover, the initial moment of the reaction time when leaving the traffic jam, which are determined by the level of functional state, affect the nature of the changes at the areas of the transportation system

Keywords: traffic safety, traffic jam, reaction time, functional state

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