MATHEMATICAL METHODS IN SOCIAL AND HUMANITARIAN SCIENCES

APPLICATION OF ECONOMIC-MATHEMATICAL SIMULATION FOR DEFINING FINANCIAL RESULTS OF THE BANK FROM ECONOMIC GROWTH

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In the article the importance of mathematical modeling for solving economic problems is considered. The dependence between the economic growth of the country and the financial result of the activity of a separate commercial bank by means of the least squares method is investigated. Conclusions have been made on the relationship between these indicators.

An important consideration is the consideration of the commercial bank as a holistic complex dynamic system operating in an unstable economy, and necessitates wider use of economic and mathematical methods and models for the study of processes occurring in the bank, assessing the efficiency of its work, identifying areas and ways to improve the management of banking activity The current state of the economy of Ukraine requires urgent improvement of the functioning of the banking system as an integral part of the financial system of the country. That is why economic-mathematical modeling can play a decisive role in restoring not only the banking sector, but also other components of the economy and the entire economy as a whole.

Modeling is an important means of solving many economic problems and, in particular, conducting analytical research, and the results of the model to a certain extent simplify the essence of the underlying processes of economic development due to the application of specific principles inherent in the nature of modeling.

On the basis of the analysis of the relationship between the volume of GDP and the financial results of the commercial bank, the following conclusions were made:

1. The size of GDP and financial results of Raiffeisen Bank Aval in the period from 2008 to 2015 are due to direct linear correlation;

2. The coefficients of the calculated regression equation are adequate, as evidenced by the calculated values of t-statistic and F-criterion and unilateral probabilities of P

3. coefficients of correlation, determination, as well as a normalized determination coefficient indicate a close connection and a high level of conditionality among the selected factors.

The application of economical and mathematical models makes it possible to assess the effectiveness of possible scenarios for the development of banks that take into account the interaction of the system and its subsystems with an active external environment.

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MATHEMATICAL MODEL OF THE ELECTRONIC SYSTEM FOR MONITORING THE PSYCHOPHYSIOLOGICAL STATE OF A LOCOMOTIVE DRIVER

Meshaninov S.K.

Abstract

The necessity to monitoring the psychophysiological state of the driver in order to increase the level of productivity and reduce the degree of risk to the health and the threat to the lives of passengers and personnel serving transportation is very relevant and timely. This is due, first of all, to the fact that the intensification of production processes on the railway, the increase in speeds and loads on the railroad train and rail track raises the reliability and safety of these processes to a fundamentally new level. In addition, it is also very important here that the very rhythm of the life of modern man has changed over the past few decades. These factors negatively affect the psychophysiological state of a person, which, in turn, puts higher and, often, qualitatively different requirements for the actions and responsibilities of the human operator, in our case, the locomotive driver. One of the main ways to solve this problem is to create a method for monitoring the psychophysiological condition of the operator in real time, which is possible on the basis of using the mathematical model of this process, as well as justifying a set of informative parameters for such control. Thus, the aim of this work is to create a mathematical model in order to obtain the most adequate assessment of a person's psychophysiological state with minimally involved resources.

It seems relevant: to create a system capable of controlling the driver's psychophysiological state in real time, taking into account the individual characteristics of the person during the working shift with the use of a non-contact sensor. The human condition is viewed as a system that, on the one hand, is characterized by such properties as additivity and invariance, and on the other hand is a system that, under the influence of external influences, changes its states over time. That is, a person's psycho-physiological state is a dynamic, linear system, with a certain set of parameters.

-The mathematical model of the control of the psychophysiological state of the locomotive driver was developed.

-The technique of diagnosing the psychophysiological state through the processing of a speech signal is suggested, which makes it possible to monitor the driver's condition both on the short and long distances during the working shift.

-Data recommendations for improving labor productivity and reducing accidents in extreme operating conditions.

-The options are improving the control system due to a change in the controlled parameters for a particular industry.

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ELECTRONIC BIOMETRIC CONTROL SYSTEM RELIABILITY OF THE FUNCTIONING OF THE HUMAN-MACHINE SYSTEM

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Abstract

In the operation of complex machines and complexes, man and machine become integrated into one complex technical system. In the process of its functioning in the subsystem "Man-Machine-Environment" there is an adaptation (interaction) of the person and the rest of its subsystems, as a result of which the reliability of functioning as a whole in the system can be both increased and lowered. The subsystem "Man-Machine-Environment" is recoverable and serviced. Therefore, it has structural, informational and functional redundancy and its reliability in general may be higher than that of the remaining subsystems of a complex technical system. The efficiency and reliability of the subsystem "Person-Machine-Environment" largely depend on the psycho-physiological characteristics of a person and on the fitness of machines to interact with a person. That is, biometric control of the physiological and psychological capabilities of a person is necessary to bear certain loads and overloads, to perceive and transmit the required information, to be in the given situation or conditions the necessary time, etc.

The human ergonomic properties are a complex of anthropometric, physiological and psychological properties.

Thus, the purpose of this work is to study the significance of the human factor in the work of a complex system of biometric control of the reliability of a complex technical system using the example of a coal mine's clearing face.

One of the main psychophysiological features of labor of miners is a high degree of their professional risk. This is due to the emergence of frequent conflict situations, created by conflicting motives of behavior in a complex production environment. An analysis of the risky actions of a person has shown that miners of coal mines often have the following motives: a disparaging attitude toward risk; indiscipline; habit of danger; revaluation of their capabilities.

A complete and unequivocal forecast of the level of safety in the conduct of work in the purification of human development is impossible because of the specific psychophysiological characteristics of a person; the number of employees, their age and qualifications can be used as controlled parameters for this factor, which should be assessed on a special scale; the main way to increase the level of safety in the bottom hole for the human factor, is to conduct training and training sessions with personnel servicing the face-cleaning staff and regular monitoring of its psychophysiological characteristics.

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MODEL FOR CONSTRUCTING AN ADEQUATE MATHEMATICAL DESCRIPTION OF THE SIGNAL CON-VERSION PROCESS IN AN ELECTRONIC SYSTEM

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Abstract

Safety and reliability of signal conversion in the electronic system is the most important criterion by which one can make an assessment of the appropriateness of using one or another version of the use of a complex of such equipment in each case, taking into account the re-quirements of accuracy, economy, safety, ergonomic and environmental standards. Considera-tion of the efficiency of any part of the measuring path is, in our opinion, the most expedient to make today with the use of a complex research method, which should be based on the con-cept of the object under consideration (or a part of it) as a complex technical system whose subsystems are in a certain interaction.

The problem of constructing an adequate mathematical description of the process of sig-nal transformation in an electronic system is considered using the example of a dynamical sys-tem with concentrated parameters, the evolution of which is described by a linear system of ordinary differential equations.

The problem of synthesizing an adequate mathematical description of the transformation of a signal in an electronic system can be formulated as follows: from the given matrices, it is necessary to construct a model of external action, with the use of which the results of mathe-matical modeling will coincide with a certain accuracy with the results of measurements. In other words, it is necessary to build a model of external influence that will give adequate re-sults of mathematical modeling using the previously chosen mathematical description (matrix). Such an approach for constructing a pair (mathematical description + external impact model) is not unique. It is also possible to first fix the model of external action (with some error), and then choose a mathematical description that would satisfy the conditions of adequacy.

The formulation of the problem of synthesis of an adequate mathematical description of signal transformation processes in the electronic system is formulated, which are well de-scribed by ordinary differential equations. Specific features of the problem are considered and a method for finding a stable solution is proposed. The problem of synthesis for a class of op-erators was formulated for the first time.

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