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RECOMMENDATIONS FOR OPTIMIZATION OF MATHEMATICAL AND OTHER MODELING OF BUILDING STRUCTURES, BUILDINGS AND STRUCTURES

Abstract: the article provides recommendations for optimizing mathematical and other modeling of seismic safety problems of building structures, buildings and structures

Keywords: scientific and management solutions, modeling, optimization, building structures, seismic safety, heuristic strategies.

Introduction

Currently, regression, correlation, similarity, simulation, argumentation and grouping methods of mathematical modeling are widely used [1].

Mathematical models are created as a result of theoretical and practical analysis of the object. Methods of mathematical planning of experiments allow us to build a mathematical model of the process or system under consideration in an optimal way on the scale of changes in factors affecting the output indicator.

If the values of one factor are considered as variables, and the rest are conditionally considered stationary, then it will be possible to build a one-factor mathematical model. If all factors are considered as variables, we will have a multifactorial mathematical model. Mathematical models are divided into static and dynamic mathematical models. If the factors of the model depend on the indicators, then the model is called a regression model, and the process of

building such a model is called regression analysis. If both the factors of the model and the model itself are random, such a model is called a correlation model, and the process of building the model is called correlation analysis [1].

During the modeling process, practical issues are solved in the following order:

- systematic analysis of the interaction between variables of a complex object;

- structural and index identification of the object;

- qualitative (incomplete) or quantitative long-term (ambient) forecasting of processes;

Materials and methods:

This includes empirical methods such as modeling, fact-finding, experiment, description and observation, as well as theoretical methods such as logical and historical methods, abstraction, deduction, induction, synthesis and analysis, as well as methods of heuristic strategies. The research materials are: scientific facts, the results of previous observations, surveys, experiments and tests; means of idealization and rationalization of the scientific approach.

Before identifying an object, a systematic analysis of the interaction of variables is performed. This allows not only to find a set of characteristic variables, but also to divide them into output values and influencing factors.

During identification, output values are set, it is necessary to find the structure of all elements and evaluate the indicators. As a result of identification, the patterns of the inspected object are revealed. When identifying with less accurate data, it becomes possible to determine how the object interacts and solve the problem of short-term forecasting.

People can make short-term predictions using only intuition. This explains why people can predict the weather without any differential equations. Here, a

heuristic, i.e. intuitive approach to decision-making is manifested [3]. But the tasks of accurate quantitative forecasting of uncertain data are solved using special self-governing modeling methods.

Results and discussion:

Mathematical models can be built by comparing the results of repeated observations or processing the results of experiments. The first method is called simulation modeling, and the second method is called experimental or self-governing modeling method [1].

The method of simulation (similar) modeling is based on the theory of automatic control. Information theory-based modeling also takes into account some probabilistic effects. The approach to self-modeling is also based on information theory.

The simultaneous use of automatic control theory and information theory in the construction of a mathematical model makes it possible to increase the accuracy of the constructed model. When using the generalized method, indeterminate elements are obtained from the results of the experiment, and specific elements are specified by the author of the model. In this case, the accuracy of the model increases due to the cancellation of opposite hypotheses [1].

The stages of building dynamic models of physical processes are as follows: study and analysis of the results of observation conducted at the facility; selection of a modeling method; replacement of a continuous process with a discrete analog; evaluation and adjustment of the coefficients of the model.

The criterion for evaluating the created model is practice. The effectiveness of modeling methods is determined by how accurately they reflect the real object, their versatility, relative simplicity, the cost of experiments

conducted in real conditions, and the ratio of costs (profitability) for creating a model.

In general, the process of building a mathematical model is performed according to the following algorithm:

1. The choice of the object of scientific research. It takes into account the necessity, relevance, economic efficiency, and modeling capabilities of the object in question.

2. The study of the object. At this stage, the structural design of the object, technological, physico-chemical processes are studied. The processes, which at first glance differ little, are studied sequentially.

3. Creation of a structural (calculation) scheme of the object. In this case, the object under study is conditionally divided into fundamental parts.

4. Creating a mathematical expression of individual joints. In this case, the process is written in the form of general equations, inequalities and tables corresponding to the terms, algorithms for their solution are developed.

5. Determination of indicators of joint equations. Physical, chemical properties, quality indicators, geometric dimensions, strength and stability, as well as seismic safety of a building structure are determined and measurement or calculation algorithms are written for them.

6. Compilation and analysis of the equations of the object. At this stage, the joint equations are linked to each other and algorithms for constructing an object calculation model are developed, taking into account boundary conditions, initial conditions and possible variable intervals.

7. The choice of methods to solve the problem. It takes into account the laws of the object's nature, technical and economic capabilities, set goals and objectives.

8. Evaluation of the accuracy of the model. The accuracy of the model should not be less than the accuracy required in the real object. If the condition

is not met, the process of building the model is reviewed anew, starting from point 4, based on heuristic strategies of cognition [1].

In addition, it is important to have a "common sense filter" at the output – an assessment of the result by a person, a competent specialist with the skills and experience of empirical and theoretical research in a particular field [2].

By building a mathematical model of a process or system with the development of a control algorithm, they lay the foundation for automatic control and control of the object. This applies, literally, to the issues of assessing the real bearing capacity, seismic safety of building structures of buildings and structures [4].

Conclusion:

With the help of a mathematical model, it is possible to control indicators that have a stronger impact and maintain them at the required level, solve issues of optimizing a process or system. The fact that a mathematical model of a process or system has not been created in management, the lack of sufficient knowledge about their dynamic properties, ignoring heuristic strategies, simply, not literacy forces you to act blindly. In this situation, the recommended heuristic strategies of the theory of knowledge and philosophy of science work well [5].

References:

1. Tojiev R.J., Yusupov A. N.. Qurilishda metrologiya, standartlashtirish va sertifikatlashtirish. Darslik. T., “Yosh avlod”, 2022, 464 b.

2. Глущенко В.В., Глущенко И.И.Разработка управленческого решения. Прогнозирование - планирование. Теория проектирования эксперментов: Учебник для ВУЗов. - М.:ЮНИТИ-ДАНА, 2011.- 456 с.

3. Эддоус М., Стенсфилд Р. Методы принятия решений. /Пер. с англ. Под ред. И.И. Елисеевой. – М.: Банки и биржи, 2010 - 819 с.

4. Юсупов А.Р. Оценка сейсмостойкости и сейсмоустойчивости железобетонных каркасных зданий и сооружений методом предельного равновесия. "Экономика и социум" №11(102) 2022. www.iupr.ru.

5. Юсупов А.Р. Эвристические стратегии интеллектуального образования. "Экономика и социум" №11(102) 2022, **www.iupr.ru**.