FORECASTING OF THE STATE OF TECHNOGENIC SITUATION USING A SIMULATION MODEL THAT IS BASED ON A MULTIDIMENTIONAL DIFFUSION EQUATION

T. Savchuk, A. Kozachuk
Vinnytsia National Technical University

In the modern world the speed of technological processes is growing rapidly. To be able to quickly and accurately assess their current and potential future state and, if necessary, change the occurrence of man-made process, it is necessary to provide effective technological systems. Application of simulation modeling allows to make such assessment of a technological system.

Consider the problem of forecasting of technogenic situation that is presented by set of characteristics, most of which can be described by stationary processes using a multidimensional data structure that describes the possible states of the technogenic situation and their change over time. The goal of the research is to improve the accuracy of determining the state of the technogenic situation through the usage of multidimentional models of technogenic situation. The object of the research is the process of forecasting of the technogenic situation. Purpose of the research is a simulation model of forecasting of the technogenic situation.

The approach of the forecasting of technogenic situation that is described in the article is based on the simulation of development of the technogenic situation using a discrete form of multi-dimensional diffusion equation. Simulation of the state of a technogenic situation is based on consistent calculation of possible states of technological situations that are stored in multidimensional data structures – hypercube of characteristics of the technogenic situation with a limitation that only the forecasted characteristic of technogenic situation is unsteady, and the remaining features are considered as those that can be described by a stationary process. This allows to perform preliminary calculations of possible states of technogenic situation that greatly reduce the complexity of predicting its status by running the main part of the intensive calculations before to main forecasting request. Additional optimizations were made to decrease calculations in case when the technogenic situation can be describe by amount of characteristics that is less or equal to four.

Keywords – simulation, multidimensional presentation of data