Increasing the Reliability of Diagnosis and Control in the Uncertainty of Primary Information

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Abstract

The paper analyzes sources of uncertainty affecting the quality of diagnosing complex technical objects. The authors proposed a theoretical rationale for the formalization of the process of building a model of stochastic influence at the training stage, to ensure minimal uncertainty of the results of multidimensional transformations at the stages of diagnosis, regardless of the type of influencing factors. An analysis of the sources of uncertainty in the diagnosis of complex objects was carried out. The necessity of planning the stages of collection and processing of primary information with complex connections reflecting the structure of the management object at the level of complex mathematical models of information transformation is proven. The work uses methods of mathematical analysis of the probabilistic structure of the control object and the synthesis of an optimal multi-parameter control system based on the maximum reliability of decision-making. The choice of the dimension of the vector of controlled signals and the number of levels of the controlled parameter made it possible to increase the reliability of decision-making and improve the information and measurement technologies of multi-alternative control and functional diagnostics of objects using random information signals for the tasks of reducing the influence of destabilization factors on the completeness of measurement information.

The model of information collection and processing in the system of operational monitoring of the conditions of technical objects in the conditions of uncontrolled factor influences has been improved. The effectiveness of the application of methods of statistical evaluation of the minimum allowable number of input values in the control system and forecasting of parametric

violations while providing the maximum expected information at a given control reliability has been proven.

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