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Reliability control of technical systems based on canonical decomposition of random sequences

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Abstract

A method for determining the suitability of a technical object for further operation based on the information about the current state and the history of its functioning during an arbitrary period of time is obtained. The check is carried out on the basis of the analysis of the state of the object under study at future points in time and the value of the posterior probability of no-failure operation. The method for predicting the individual reliability of objects is based on the canonical decomposition of a random sequence describing the change in the value of the controlled parameter over time. As an estimate of the future state, the conditional mathematical expectation is used; to estimate the probability of no-failure operation, statistical modeling of a random sequence beyond the observation area is performed. The method can also be used to control the reliability of the objects that are characterized by many parameters (in this case, the vector canon-ical decomposition is used). The proposed approach does not impose any restrictions on the random sequence of change of the controlled parameters and, thus, makes it possible to fully take into account the peculiarities of the functioning of the object under study. The work presents block diagrams that characterize the features of using the proposed method. Expressions for assessing the quality of predicting the state of the controlled object are obtained.

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Author keywords

Canonical decomposition; Extrapolation of random sequences; Random sequences; Reliability control

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