MONITORING, MODELING AND BEHAVIOR ANALYSIS OF STRUCTURES

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Information technology and modeling are becoming more widely used, mainly in the design and operation of buildings and structures, and in most cases this is enough for trouble-free operation. Nevertheless, there is a category of buildings for which the monitoring of the technical condition should be an integral part of the construction and operation. Unfortunately, the development of these technologies in the Russian Federation is not at level, sufficient for answering questions about the behavior of objects under changing environmental conditions and revealing hidden patterns in monitoring data. Based on analysis of literary sources, the authors reviewed various methods for identifying hidden patterns in geodetic measurement data when monitoring buildings and structures. It is noted that modern analysis methods are based on statistical processing of measurement results and on statistical forecasting method. However, there are attempts to apply models that take into account object's design features and temperature regime. This type includes two proposed models, which are used to model three-dimensional coordinates of strain marks in the 3D model and only elevations of marks in the 1–Z model. The article presents the rationale for the simulated geometric elements and properties of the object. The solution of the equations of both models and the analysis of the results and parameters of the model for measurement epochs are shown. The simulation is shown on the example of a real object, which was monitored by the authors in 2015–2016.The authors believe that the monitoring of large-span structures and the search for patterns of their behavior should be an integral part of the information system for such structures.

Keywords: geodetic measurements, environmental parameters, monitoring, thermal model, deformations, large-span structures, pattern analysis

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