ASSESSMENT OF THE GEODYNAMIC SITUATION OF THE VORONEZH CRYSTALLINE MASSIF FROM GEODETIC DATA

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Repeated geodetic measurements allow you to evaluate such geodetic elements as coordinates, heights, and directions. And also represent discretely the field of displacement vectors of geodesic points. The obtained vectors allow us to determine the stress-strain state of the earth's surface according to the accepted model. There is a reasonable opinion about the significant presence of rotational (vortex) movements in geodynamic processes. Here, the corresponding algorithms are used for the territory of the Voronezh Crystal massif. Separately, it is possible to calculate the differential characteristics of the vector field, called divergence (div) and rotor (vortex, rot, curl). The article proposes to determine the rotor field from discrete geodetic observations of displacement vectors on the surface of the studied territory. The most important continuation of this research work is the method of mathematical modeling of geodynamic systems for predictive purposes. For the study of complex (nonlinear) geodynamic processes, an appropriate mathematical basis should be chosen. Here, attention is drawn to the involvement of the mathematical foundations of field theory. To evaluate the characteristics of vector fields when using repeated geodetic measurements, the method of finite elements can be used. Dividing the territory under study into triangles allows us to determine the deformation characteristics after calculating the elements of the strain tensor. In particular, the value of the angular velocity of the triangle rotation relative to its center of gravity is found. Next, it is easy to calculate the value of the rotor. The example given in the article of real geodetic observations on the Voronezh crystal massif confirms the possibility of predicting the location of an upcoming seismic event – an earthquake.

Keywords: Vector field, geodesic data, geodynamic polygons, finite element method, kriging, rotor

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