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The use of theory of catastrophes for predictability of high energetic responses of rock massif on explosion influence

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When conducting mining operations in high-stress rock massifs, technogenic seismicity is manifested, with forecasting and prevention issues being given much attention in all countries with a developed mining industry. From the point of view of the paradigm of physical mesomechanics, which includes a synergetic approach to changing the state of rock massifs of different material composition, this problem can be solved with the help of monitoring methods tuned to the study of hierarchical structural media. Changes in the environment, leading to short-term precursors of dynamic phenomena, are explained within the framework of hierarchical heterogeneity and nonlinearity.

It is shown that the mining process, which is a dynamic process, can be controlled following the recommendations given by the catastrophe theory. In this process, as control parameters are the values of energy in explosions and the location of these explosions relative to the area of the array being studied or worked. The kinematic and dynamic parameters of deformation waves [1, 2], as well as structural features of the array through which these waves pass [3], act as internal parameters. The use of analysis methods for short-term and medium-term forecast of the state of a mountain massif only when using control parameters is not sufficient in the presence of a sharp heterogeneity. However, the joint use of qualitative recommendations of the theory of catastrophes and spatial-temporal data of changes in the internal parameters of the array will prevent a catastrophe during the mining of mine massifs.

Reference

1. Hachay O.A., Khachay O.Yu., Klimko V.K. Dynamical characteristics of slow deformation waves as massif response on explosion influence // Mining Information-analytical bulletin. – 2013, –№ 5. – pp. 208–214 (in Russian).

2. Hachay O.A., Khachay O.Yu., Shipeev O.V. Research of hierarchic structure of dynamical characteristics of slow deformation waves as massif response on explosion influence // Mining Information-analytical bulletin. – 2013, –№ 5. – pp. 215–222 (in Russian).

3. Hachay O.A., Khachay O.Yu., Klimko V.K., Shipeev O.V. Research of nonlinear dynamical state of rock massif according to data of seismic catalogue in deep mines during technogenic influence // Mining Information-analytical bulletin. – 2016, –№ 4. – pp. 217–230 (in Russian).