Geophysical Research Abstracts
Vol. 13, EGU2011-1528, 2011
EGU General Assembly 2011

Construction of a state evolution dynamical model of a rock massive, which is in a regime of energetic pumping

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In the paper [1-3] it had been showed the opportunity of use the mathematical results of the state theory of open dynamical conservative and dissipative systems, to which are related rock massifs in the mines. As a dynamical system we understand an object or process, for which the concept state is defined as a value part of some values in a given moment of time and defined an operator, which describes the evolution of the initial state in time. As a rule the state control of rock massifs in the mines is organized not continuous but in a frame of observation cycles, or in discrete moments of time. For description of its evolution the difference analogue of differential evolution equations is used. With application to our problem for state massive research, which is influenced by energy pumping the model of heterogeneous no stationary dissipative system is the best for its describing. Analyses of dynamical system phase portrait allow characterizing the system during the period of observation. For realization of dissipative regimes changing clarifying for real rock massifs, which are influenced by explosions the data of Tashtagol mine seismic catalogue for the period of two years from June 2006 to June 2008 had been used. We traced the evolution of morphology changing of phase trajectories of massive response, which was in a local time in a stable state: there was a local area as a clew of interlacing trajectories and small over shootings from that clew which were lower than 105 joules. That feature is observed for all periods of time in spite of some time moments when the overshooting is higher, than 105 joules reaching to 106 joules and yet 109 joules. Since the researched massive volume was the same and we had researched the process of activation and activity decay then it is obviously that we had observed two mutual depending processes: energy accumulating in the attracting phase trajectories area and resonance release of the attracted energy. After that release the system returns to the attracting phase trajectories area. The received results lead us to use a new problem definition for mathematical modeling. We used the theoretical conception formulated in the book [4] which consists in: we must use nonlinear equations for description of the evolution process. That leads to no superposition of partial linear solutions and no linearization of the problem. That approves unexhausted set of possible directions of dissipative process evolution and also provides appearance in the continuum discrete space-time scales, which characterize the features of nonlinear medium no depending from outer influence. Nonlinear dissipative media can reveal the inner order, which characterizes by spontaneous appearance in the continuum complicated dissipative structures; during their evolution we can see self organization.

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