



Synergetic events in geological medium and nonlinear features of wave propagation.

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Geological medium is an open dynamical system, which is artificially and naturally influenced on different scale levels, which change it's state and which lead to a complicated many ranked hierarchic evolution. That is a topic of the synergetic theory (or science of self organization). The idea of physical meso mechanics which was elaborated by Russian academician Panin V.E., which includes the synergetic approach, is a constructive method for research of the state of heterogenic materials. That result had been obtained for specimens of different materials. In our investigations of time-dependent geological medium in the frame of natural experiments in real rock massive, which are hard man-caused influenced it had been showed, that the dynamics of the state can be revealed by using synergetic approach for hierarchic media. The important role for research of dynamic geological systems play the use of active and passive geophysical monitoring, which can be achieved with use of electromagnetic and seismic fields. As it had been showed by our experience the change of the system on the researched space bases and times can be revealed by parameters, linked with peculiarities of the medium of the second and higher rank. Thus the research of the state dynamics and the events of self organization we can provide with geophysical methods, oriented on the many ranked hierarchic time-dependent model of the medium. For fields of plastic deformation and stresses it had been considered a system of differential equations. The developing theory of modelling and interpretation of geophysical monitoring data must be active guided by the mathematical methods of nonlinear dynamics and control. The developing of that direction can allow us to forecast and prevent catastrophic man-made events (rock bursts). We had elaborated a new approach of forecasting such events using the method of constructing phase portraits using the data of electromagnetic monitoring and detailed seismological catalogue.