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Accounting hierarchical heterogeneity of rock during its working off by explosive methods

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First the phenomenon of zonal disintegration of rocks around excavations have been described and published as a discovery. Questions of structures formation are related to the fundamental problems of the natural sciences and the study of the structural appearance is one of the most important purposes of scientific knowledge. In real systems, considered in physics, it had been found spatial and temporal structures. The temporal structures are inseparable from the dynamics of the system, here it are particularly important principles of pointedness and causality. Formation of structures by irreversible processes is associated with a qualitative leap when it reaches the critical parameters. Self organization is a supercritical phenomenon when the system parameters exceed their critical values. When the system deviates greatly from its equilibrium, it's state variables satisfy the nonlinear equations. Non linearity is an important and common feature of the processes taking place far from equilibrium.
By that the supercritical output of entropy is only possible if there is an unusual, special internal structure of the system. This means that self-organization is not a universal property of matter; it exists in certain internal and external conditions and is not associated with a particular class of substances. So, there are two classes of irreversible processes: 1.Destroying of the structure near the equilibrium position that is a universal property of systems under arbitrary conditions. 2. Occuring structures far from the equilibrium position under the conditions that the system is open and has a non-linear internal dynamics and its external parameters have supercritical parameters. Prigogine called them dissipative structures. The study of the morphology and dynamics of the migration of these zones is of particular importance when developing deep deposits, complicated by, dynamically events as rock bursts.
Important tools for this study are the geophysical surveys. Because the information about the structure and state of the environment can be obtained from the geophysical data by interpreting them in frames of the model, which is an approximation to the real environment, therefore you must select it from the class of physically and geologically reasonable. For a description of the geological environment in the form of a rock massif with its natural and technogenic heterogeneity we should use more adequate description as is a discrete model of the environment in the form of a piece wise non-homogeneous block media with embedded heterogeneities of lower rank than the block size . This nesting can be traced back several times, ie, changing the scale of the study, we see that the heterogeneity of lower rank now appear as blocks for the irregularities of the next rank. The simple average of the measured geophysical parameters can lead to a distorted view of the structure of the environment and its evolution. The Institute of Geophysics, UB RAS has developed a hardware-methodological and interpretative system for studying the structure and state of complex geological environment, which has the potential instability and the ability to rebuild the hierarchy structure with significant external influence. The basis of this complex is the developed 3-D technique planshet electromagnetic induction studies in frequency geometrical variant, resting on one side on the interpretation software system for 3-D alternating electromagnetic fields, and on the other hand on developed by Ph.D. A.I.Chelovechkov device for carrying out the inductive research. On the basis of this technology the active monitoring of the structure and state of the rock massif inside the mines of different material composition can be provided, it can be carried out to detect short-term precursors of strong dynamic phenomena according to the electromagnetic induction monitoring. There are developed algorithms for modeling of electromagnetic fields in hierarchic heterogeneous media.