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Acoustic Monitoring of Anomalous Stressed Zones, Determination of their Positions, Surfaces, Evaluation of Catastrophic Risk.

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Self-organization is not a universal property of matter, it exists under certain internal and external conditions and this is not associated with a special class of substances. The study of the morphology and dynamics of migration of anomalous zones associated with increased stresses is of particular importance in the development of deep deposits, complicated by dynamic phenomena in the form of mountain impacts. An important tool for this study is geophysical exploration. To describe the geological environment in the form of an array of rocks with its natural and technogenic heterogeneity, one should use its more adequate description, which is a discrete model of the medium in the form of a piecewise inhomogeneous block medium with embedded heterogeneities of a lower rank than the block size. This nesting can be traced several times, i.e. changing the scale of the research, we see that heterogeneities of a lower rank now appear in the form of blocks for heterogeneities of the next rank. A simple averaging of the measured geophysical parameters can lead to distorted ideas about the structure of the medium and its evolution. We have analyzed the morphology of the structural features of disintegration zones before a strong dynamic phenomenon. The introduction of the proposed integrated passive and active geophysical monitoring into the mining system, aimed at studying the transient processes of the redistribution of stress-strain and phase states, can help prevent catastrophic dynamic manifestations during the development of deep-seated deposits. Active geophysical monitoring methods should be tuned to a model of a hierarchical heterogeneous environment. Iterative algorithms for 2-D modeling and interpretation for sound diffraction and a linearly polarized transversal elastic wave on the inclusion with a hierarchical elastic structure located in the J-th layer of the N-layer elastic medium are constructed. The case is considered when the inclusion density of each rank coincides with the density of the containing layer, and the elastic parameters of inclusion of each rank differ from the elastic parameters of the containing layer.