

Defining of the 2-D surface of the anomaly stressed magnetic hierarchical object located in the layered blocked geological medium using the data of acoustic and electromagnetic monitoring

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Geological medium is an open system which is influenced by outer and inner factors that can lead it to an unstable state. Such non stability usually occurred locally in zones, which we name as dynamically active elements. They can be indicators of potential catastrophic events. These zones differ from the surrounding geological medium by their structural forms, which are often of hierarchical type. The process of their activization can be researched with use of wave fields monitoring. For that purpose we had earlier developed algorithms of modeling wave field propagation through the local objects with hierarchical structure. This paper concerns a new approach for interpretation of the distribution of wave fields for determining of the contours of these local hierarchical objects. In this work we consider an algorithm for constructing of two equations of theoretical inverse problem for 2D linear polarized transverse elastic wave and transverse electromagnetic field by excitation of the N -layered elastic and conductive medium with hierarchic elastic, anomaly stressed and magnetic inclusion located in the ν -th layer with the density and conductivity equal to the density and conductivity of the layer. An iteration process of solving the inverse problem for the case of certain configurations of hierarchical 2-D inclusions of k -th rank is elaborated. When interpreting the results of the monitoring it is needed to use the data of such systems that are configured to study the hierarchical structure of the medium.

Findings. From the theory it is obviously that for such complicated medium each wave field contains its own information about the inner structure of the hierarchical inclusion. Therefore it is needed to interpret the monitoring data for each wave field apart, and not mixes the data base.

Practical value/implications. These results will be the base for constructing new systems of monitoring observations of dynamical geological systems. Especially it is needed to prevent rock shocks in deep mines by their exploitation or natural hazards.

Keywords: hierarchic medium, seismic field, algorithms of modeling, equation of theoretical inverse problem.