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Algorithm for solving the inverse problem for active electromagnetic and acoustic monitoring of geological environment with composite hierarchical multiranked inclusions

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A new approach to the interpretation of wave fields has been developed to determine the contours or surfaces of local hierarchical objects. An iterative process has been developed for solving a theoretical inverse problem for the case of determining the configurations of 2D composite hierarchical inclusions of various ranks. When interpreting the results of monitoring, it is necessary to use data from such observation systems that can be configured to study the hierarchical structure of the environment. Such systems include seismic (in the dynamic version) and electromagnetic monitoring systems. On the other hand, the more complex the environment, the each wave field introduces its information about its internal structure, therefore, the interpretation of the seismic and electromagnetic fields must be conducted separately, without mixing these databases. This result is contained in the explicit form of the equations of the theoretical inverse problem for a 2D electromagnetic field (E and H polarization), as well as for the propagation of a linearly polarized elastic wave when excited by an N-layer conducting or elastic medium with a hierarchical conducting or elastic, plastic, density located in the ν -1, ν, ν + 1 layers.