



Reflection of hierarchical medium structures of different scales in the space time data of wave fields distribution.

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The last decades are characterized by active development of Earth's sciences. The modern research methods and technologies give the opportunity to obtain new data about the Earth's structure and processes, which occur in its interior. The conception development about the nonlinear geodynamics practically coincides with research of nonlinear processes in different parts of physics. In geology soliton and auto wave conceptions are developed, principles of synergetic and self organization become be used, in geodynamics the macro quantum behavior of large mass matter, which are in critical state, in geophysics the auto wave nature of geophysical fields is researched in a frame of a new structural model with hierarchical inclusions. It is very significant to define the time of reaction lagging, in spite of the influence on the massif can be assumed as elastic. The unique model which can explain that effect is a model of the massif with a hierarchic structure. We developed a mathematical algorithm using integral and integral-differential equations for 2-D model for two problems in a frequency domain: diffraction a sound wave and linear polarized transverse wave through a arbitrary hierarchy rank inclusion plunged in an N-layered medium. That algorithm differs from the fractal model approach by a freer selecting of heterogeneities position of each rank. And the second, the problem is solved in the dynamical approach. The higher the amount of the hierarchic ranks the more is the degree of nonlinearity of the massive response and the longer can be the time of massive reaction lag of the influence. For research of hierarchic medium we had developed an iterative algorithm for electromagnetic and seismic fields in the problem setting similar to analyze higher for layered-block models with homogeneous inclusions. We had developed an iterative algorithm of inverse problem solution for the same models, using the approach of three stage interpretation. For that we had developed a new integral differential equation for the theoretical inverse problem of 2-D electromagnetic field in a hierarchic inclusion, embedded in the N-layered medium.

References:

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