



About wave field modeling in hierarchic medium with fractal inclusions

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The processes of oil gaseous deposits outworking are linked with moving of polyphase multicomponent media, which are characterized by no equilibrium and nonlinear rheological features. The real behavior of layered systems is defined as complicated rheology moving liquids and structural morphology of porous media. It is eargently needed to account those factors for substantial description of the filtration processes. Additionally we must account also the synergetic effects. That allows suggesting new methods of control and managing of complicated natural systems, which can research these effects. Thus our research is directed to the layered system, from which we have to outwork oil and which is a complicated hierarchic dynamical system with fractal inclusions. In that paper we suggest the algorithm of modeling of 2-d seismic field distribution in the heterogeneous medium with hierarchic inclusions. Also we can compare the integral 2-D for seismic field in a frame of local hierarchic heterogeneity with a porous inclusion and pure elastic inclusion for the case when the parameter Lamé is equal to zero for the inclusions and the layered structure. For that case we can regard the problem for the latitude and longitudinal waves independently. Here we shall analyze the first case. The received results can be used for choosing criterions of joined seismic methods for high complicated media research. If the boundaries of the inclusion of the k rank are fractals, the surface and contour integrals in the integral equations must be changed to repeated fractional integrals of Riman-Liuvill type. Using the developed earlier 3-d method of induction electromagnetic frequency geometric monitoring we showed the opportunity of defining of physical and structural features of hierarchic oil layer structure and estimating of water saturating by crack inclusions. For visualization we had elaborated some algorithms and programs for constructing cross sections for two hierarchic structural levels. That allows managing the process of drainage and steeping by water displacement the oil out of the layer.

Keywords: electromagnetic, seismic fields, theory, processing, visualization, methods and examples.