



Modeling and using phase diagrams method for analyzing active acoustic monitoring data from oil wells

Oleg Yu. Khachay (1) and Olga Hachay (2)

(1) Ural Federal University, Mathematics and Computer Science, Yekaterinburg, Russian Federation (khachay@yandex.ru),

(2) Institute of Geophysics Ural's Branch of RAS, Yekaterinburg, Russian Federation (olgakhachay@yandex.ru)

A method for mapping and monitoring a heterogeneous complex two-phase medium is proposed, which can be used to control the production of viscous oil in mine conditions and light oil in sub horizontal wells. The requirements of an effective economic performance and the most complete extraction of hydrocarbons in the fields dictate the need to create new geological technologies for the development of oil and gas fields based on fundamental advances in geophysics and geomechanics. A new 2D modeling algorithm has been developed for diffraction of sound on elastic and porous moisture-saturated inclusions of a hierarchical structure located in the J-th layer of an N-layer elastic medium. The method of phase diagrams was used to estimate the response of the fluid-saturated array to the external active influence, the changes in the state of the array associated with its structural rearrangements. These results are the basis for building new mapping systems and monitoring geological systems. This is especially in demand for the mapping of oil and gas fields and the forecast of their effective useful effect. A method for mapping and monitoring a heterogeneous complex two-phase medium is proposed, which can be used to control the production of viscous oil in mine conditions and light oil in sub horizontal wells. The requirements of an effective economic performance and the most complete extraction of hydrocarbons in the fields dictate the need to create new geotechnologies for the development of oil and gas fields based on fundamental advances in geophysics and geomechanics. A new 2D modeling algorithm has been developed for diffraction of sound on elastic and porous moisture-saturated inclusions of a hierarchical structure located in the J-th layer of an N-layer elastic medium. The method of phase diagrams was used to estimate the response of the fluid-saturated array to the external active influence, the changes in the state of the array associated with its structural rearrangements. These results are the basis for building new mapping systems and monitoring geological systems. This is especially in demand for the mapping of oil and gas fields and the forecast of their effective useful effect.