

Modeling of the Elastic Properties of Bitumen-Saturated Sandstone in the Deposits of the Ufimian Stage of the Permian System

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Abstract

Modeling of the elastic properties of a bitumen-saturated sandstone layer in the deposits of the Ufimian Stage of the Permian System was performed using the data from well logging and core research. Since elastic properties link the geological model parameters and the wave field amplitudes, this study seems to be of high relevance. Such modeling expands the possibilities of geophysical data interpretation and improves the reliability of seismic forecasts. The seismic methods are informative for monitoring the production of reserves, including the deposits under consideration, by taking into account the features of layers occurrence and the saturating fluid. Our core study of the deposits is based on the X-ray phase analysis and the interpretation of well logging data. The results of the laboratory study were indicative to evaluate the settings of the obtained volumetric lithological model. The lithological model must be adjusted correctly, because it enables the estimation of the variability of the reservoir characteristics by its thickness, which, in turn, helps to provide a better forecast of its reservoir properties and elastic characteristics. The accuracy of the modeling results was estimated and analyzed. The petroelastic modeling carried out by us yields valuable data for both reservoir and non-reservoir forecasts in the studied geological section.

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Keywords

Bitumen-saturated sandstone, Elastic properties of rocks, Modeling of elastic properties, Well logging, X-ray phase analysis

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