

Analysis of reservoir properties based on X-ray computed tomography of sludge

Rail Kadyrov

Kazan Federal University, Institute of Geology and Petroleum Technologies, Russian Federation (rail7777@gmail.com)

Modern methods of oil fields developing require drilling with coring, but the cost of such operations is very high. In contrast, sludge drilling allows reducing the cost of the work more than two times. Core is used for the standard geological and technical research, especially it is important for definition of porosity and permeability. However, the same result can be achieved using X-ray computed tomography of sludge.

In the course of the research, experiments on the comparison of porosity achieved by standard method of liquid saturation and X-Ray computed tomography in different resolutions were done. The best porosity representation scales depends on rock type and its minimal permeable for liquid pore size. It is shown that the porosity of the sample is due to matrix porosity generally. Another problem solved in the research was a destruction of strongly fractured, friable and fine lithotypes in a well and crumbling of drilled rocks. Statistical analysis of geometrical properties of porous space, such as multifractal parameters, allowed distinguishing the samples from different levels. The same pores are responsible for permeability in the investigated range 100-10 μm , regardless to the observation scale. Permeability was computed using digital 3D models and correlated with data obtained by water permeability testing system.

Thus, the technology of reservoir properties analysis based on X-Ray computed tomography of sludge was developed.