

Experimental Study of the Hydraulic Fracture Formation and Propagation

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Abstract. Hydraulic fracturing is the primary method of intensifying the oil flow to the well. Despite the long history of this method's application and the variety of software aimed at hydraulic fracturing design, oil-producing and oil service companies often face problems during hydraulic fracturing, some of which are associated with insufficient elaboration of physical models used in software packages. Sadovsky Institute of Geosphere Dynamics of Russian Academy of Sciences has developed and constructed a unique installation that allows conducting hydraulic fracturing experiments on samples of artificial porous material selected in accordance with similarity criteria. The samples have the shape of disks with a diameter of 430 mm and a height of 70 mm. The installation allows loading samples along three independent axes, creating pore pressure gradients, measuring the fluid pore pressure at several points, registering acoustic emission, probing the sample with acoustic pulses. The article discusses the results of experiments conducted at this installation, shows the need to advance the models used to describe the process of formation and propagation of hydraulic fractures in a permeable formation in a complex stress state. The results of experiments on the study of the hydraulic fracture interactions with discontinuity created in advance in the model sample are also presented.

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