

Interactions of hydraulic fractures

**Sergey Turuntaev^{1,2}, Evgeny Zenchenko¹, Maria Trimonova¹, Petr Zenchenko¹,
Nikolay Baryshnikov¹, Akbota Aigozhieva^{1,2}**

**¹Institute of Geosphere Dynamics of Russian Academy of Sciences, Russia,
Moscow, Leninsky prosp. 38, k.1**

**² Moscow Institute of Physics and Technology, Russia, Moscow district,
Dolgoprudny, Institutskiy per. 9
E-mail: s.turuntaev@gmail.com**

Abstract

The influence of the hydraulic fracture presence in the neighbouring boreholes on the fracture propagation was investigated in laboratory experiments. The experiments were conducted on the artificial porous saturated samples in accordance with the similarity criteria. The samples were made from gypsum/cement mixture and had a disc shape with a diameter of 430 mm and a height of 65 mm. In the samples, three boreholes were prepared. The samples were saturated by gypsum water solution and were loaded with vertical and horizontal stresses. The hydraulic fractures were produced by mineral oil injection through one or another borehole under constant fluid rate. The fluid pressure was measured in the boreholes as well as at several points in the sample bottom side. The fracture propagation rate was measured both directly and indirectly.

A set of experiments was conducted, in which the main stress axis orientation was changed after the first hydraulic fracture creation, and the influence of the new stress state on the fracture orientation was examined. It was found that the deviation of the hydraulic fracture from the initial direction of the maximum compressive stress was related to the perturbation of the stress field by fractures created earlier.

The obtained results can be used to verify the numerical simulation of the hydraulic fracture propagation and for adequate interpretations of the field data.