



Determining the spatial altitude of the hydraulic fractures.

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Mathematical modeling and numerical simulation are the most widely used approaches for the solving geological problems. They imply software tools which are based on Monte Carlo method.

The results of this project presents shows the possibility of using PNL tool to determine fracturing location.

The modeled media is a homogeneous rock (limestone) cut by a vertical borehole ($d=216$ mm) with metal casing 9 mm thick. The cement sheath is 35 mm thick. The borehole is filled with fresh water. The rock mass is cut by crack, filled with a mixture of doped (gadolinium oxide Gd_2O_3) proppant (75%) and water (25%).

A pulse neutron logging (PNL) tool is used for quality control in hydraulic fracturing operations. It includes a fast neutron source (so-called "neutron generator") and a set of thermal (or epithermal) neutron-sensing devices, forming the so-called near (ND) and far (FD) detectors.

To evaluate neutron properties various segments (sectors) of the rock mass, the detector must register only neutrons that come from this very formation. It's possible if detecting block includes some (6 for example) thermal neutron detectors arranged circumferentially inside the tool.

As a result we get few independent well logs, each accords with define rock sector. Afterwards synthetic logs processing we can determine spatial position of the hydraulic fracture.