Simulation of near-wellbore fracture reorientation using fully 3D model of hydraulic fracture

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The models of fracture initiation from perforated wellbore [1] as well as models of developed fractures propagation [2] are well developed. But the fracture propagation from the wellbore to the preferred fracture plane is rarely investigated. On the one hand this process affects the entire fracturing propagation (near-wellbore pressure loss, pinching, proppant plug, etc.) and should be simulated. On the other hand the modeling of the near-wellbore fracture propagation is resources consuming because of complex geometry (perforations, non-planar fracture geometry) and a lot of physical processes coupled together. if one could neglect some processes, then the modeling would be easier.

The previously developed 3D model of hydraulic fracture [3] is used to estimate the errors caused by some neglecting simplifications. The main questions under considerations are following. Is it possible to neglect the perforations if the initial fracture has already formed? Is it important to simulate the fluid flow inside the fracture or constant pressure distribution can be used instead? The 3D model simultaneously accounts rock deformation in the wellbore, the fluid flow inside the fracture and the fracture propagation described by 3D implicit criterion. It makes the model suitable for simulation of the fracture propagation under various assumptions.

References

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