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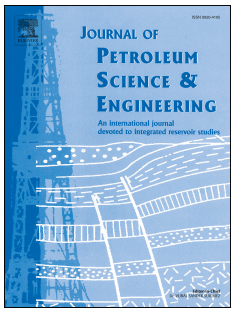

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Influence of Gravel on the Propagation Pattern of Hydraulic Fracture in the Glutenite Reservoir

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Abstract: The clear mechanism of hydraulic fracture propagation in glutenite reservoirs with high heterogeneity is still not obtained, thus it is difficult to carry out the design of fracturing plan effectively. Based on the characteristics of the glutenite reservoirs, a coupled flow-stress-damage (FSD) model of hydraulic fracture propagation with gravels is established. This model is experimentally verified and the research on the influence of rock physical parameters and gravel property on the hydraulic fracture propagation is conducted. It is shown that as the gravel tensile strength increases, the hydraulic fracture is prone to propagate around the gravel, where the fracture deflection always occurs; as the gravel Young's modulus increases, there is high probability that hydraulic fracture propagates around the gravel, with more obvious fracture deflection; the matrix permeability influences fracture propagating morphology when encountering gravel and total fracture length; the horizontal geostress difference seriously impacts the fracture deflection; as the fracturing fluids injection displacement increases, the fracture is prone to deflect when encountering gravel; the low viscosity fracturing fluids result in the shorter fracture; the larger gravel increases the possibility of fracture deflection; in case of smaller gravel sizes, the increasing gravel content has a big influence on fracture deflection, and the increasing content of large gravel complicates the fracture morphology, resulting in the fine branched fractures; for the well rounded gravel, the fracture propagation around the gravel is prone to occur, and the fracture is not prone to deflect. Compared with the conventional sandstone reservoir, the glutenite reservoirs have higher breakdown and extension pressures, which fluctuate due to the gravel; the larger gravel size results in higher extension pressure. In this paper, a simulation method of hydraulic fracture propagation in the glutenite reservoirs is introduced, and the result