Modeling and Simulation of Reservoir Poroelastic Response During Hydraulic Fracturing

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Abstract

Fault reactivation and induced fracturing may stem from reservoir depletion/fluid injection for EOR. These operations induce stress changes which alter native regime in reservoir; hence characterization of these perturbations during hydraulic fracturing is needed. Fluid production after placement of initial fracture can cause a local redistribution of pore pressure in an expanding elliptical region around the wellbore. This fact is of prime concern especially in case of refracturing which has rapidly gained momentum in the industry. Unanticipated production increases from refractured wells having effective initial fractures and pressure responses during refracturing can be explained using concepts of poroelasticity and stress redistribution after water injection, as in the case of fracturing. The problem statement of this paper entails determination of changes in prevalent stress state in a homogeneous reservoir due to conditions of pressure depletion/injection due to formation poroelasticity, followed by simulating this effect to demonstrate changes in fracture containment within the reservoir.