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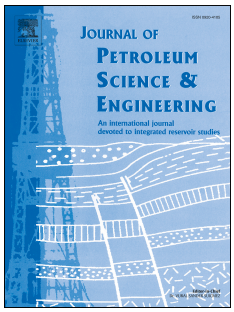

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Numerical simulation of a wellbore stability in an Iranian oilfield utilizing core data

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Abstract

Breakouts and induced tensile fractures are the two most important consequences of drilling operations. Breakouts are more important due to their influences on the formation of plastic zone around borehole wall, collapse and subsequent size changes of the borehole. According to the principles of fracture mechanics, borehole breakouts often occur with complicated failure mechanisms, involving both tensile and shear fractures. In this study, a boundary element numerical code (TDDQCR) is used to simulate the process of formation of borehole breakout after twenty steps of crack propagation in a vertical well in the south west of Iran. Then, these numerical simulation results are validated by FMI data which are obtained from the target well. This validation process shows that a very narrow and unclear breakout zone can be predicted by both numerical simulation and FMI data. The extension of plastic zone around the borehole wall is also simulated by a finite difference code (i.e. FLAC^{3D} software). However, this numerical result did not predict any failure zone around the borehole wall. Therefore, based on this research, the target well is claimed to be in the stable condition.

Key words: Wellbore stability, breakout, crack propagation, FMI