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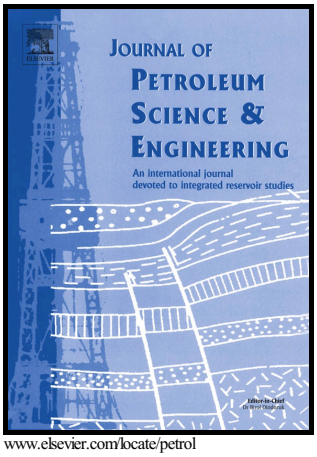

www.elsevier.com/locate/petrol

PII: S0920-4105(16)30244-3
DOI: http://dx.doi.org/10.1016/j.petrol.2016.06.024
Reference: PETROL3515

To appear in: *Journal of Petroleum Science and Engineering*

Received date: 10 January 2016
Revised date: 9 June 2016
Accepted date: 13 June 2016

Cite this article as: Mostafa Mansourizadeh, Majid Jamshidian, Pouya Bazargan and Omid Mohammadzadeh, Wellbore Stability Analysis and Breakout Pressure Prediction in Vertical and Deviated Boreholes Using Failure Criteria – A Case Study, *Journal of Petroleum Science and Engineering* http://dx.doi.org/10.1016/j.petrol.2016.06.024

Wellbore Stability Analysis and Breakout Pressure Prediction in Vertical and Deviated Boreholes Using Failure Criteria – A Case Study

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Abstract

Wellbore instability is one of the most critical challenges that continuously appear in drilling and production operations. Borehole breakout, as the enlargement and elongation of a borehole in a preferential direction, is an important phenomenon which should be addressed when stability of the wellbore is analyzed. Breakout pressure is an important parameter in wellbore stability analysis. In this paper, a geomechanical model was constructed using several petrophysical, field and lab data for one formation of interest to evaluate in-situ and induced stresses. Three shear failure criteria, namely Mohr-Coulomb, Mogi-Coulomb and Hoek-Brown were used to predict the breakout pressure profile and the outcomes were validated with 4-arm caliper log data of the well. The effect of azimuth and inclination of the deviated wells on the breakout pressure was investigated using stress transformation equations. It was found that the Hoek-Brown failure criterion with optimized constants resulted in the best prediction of the breakout pressure for this particular case under study. As for the deviated wells, inclination had an increasing effect on the breakout pressure whereas azimuth relative to the maximum horizontal stress could counteract it.