

McLellan, P.J., Wang, Y., Predicting the Effects of Pore Pressure Penetration on the Extent of Wellbore Instability: Application of a Versatile Poro-Elastoplastic Model, SPE/ISRM 28053, EUROCK 94 - Rock Mechanics in Petroleum Engineering, A Joint SPE/ISRM Meeting, The Hague, Netherlands, August 1994.

Abstract

A pro-elastoplastic wellbore stability model, which accounts for the presence of an internal filter cake in a plastic yielded zone and capillary threshold pressures has been developed for a Mohr-Coulomb, strain-weakening material. The extent of the plastic yielded zone may be predicted for steady state fluid inflow (underbalanced) or outflow (overbalanced) conditions. The model predicts that for overbalanced drilling conditions the filter cake efficiency, or its ability to reduce pore pressure penetration, can significantly affect the extent of the plastic yielded zone which can develop in a permeable formation. Example applications of the model to drilling and completing horizontal wells in a unconsolidated, bitumen saturated sand and in a weak, cemented sandstone are described.

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