

Hawkes, C.D. and McLellan, P.J., Transient Poro-elastoplastic Modeling of Yielded Zone Enlargement Around an Unstable Wellbore, Presented at the 2nd North American Rock Mechanics Symposium - NARMS '96, Montreal, Quebec, June 1996.

Abstract

The effects of pore pressure penetration and time-dependent rock strength on the growth of the yielded (plastic) zone around a wellbore are analyzed using an elastic-brittle-plastic model. Solutions for two possible cases are developed: (1) no increase in permeability, and (2) a significant increase in permeability upon yielding. The extent of the yielded zone is sensitive to a number of mechanical parameters, of which the residual strength of the rock is most critical. In both cases, the rate of yielded zone growth depends strongly on formation permeability (both prior to and after yielding) and mud filtrate viscosity. In case (2), the stiffness of the rock and the extent of the yielded zone are also critical.

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