

Abstract

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CFD Simulation of Filter Cake Formation in Deep Wellbore Drilling Using Non-Newtonian Eulerian-Lagrangian Model

During oil wellbore drilling processes, filter cake is formed on the sidewalls of the well hole due to filtration of drilling fluid particles. The filter cake is crucial to the drilling process, since it helps to maintain the wellbore hole, protects the drilling bit from jamming and facilitates the subsequent phases of the well development. The most important parameter for filter cake formation is its thickness and its variation due to drilling conditions. In this paper, the drilling fluid particles filtration process was simulated at conditions mimicking deep wellbore drilling. The drilling fluid was simulated as a non-Newtonian two-phase fluid of liquid and particles, utilizing an Eulerian-Eulerian approach. The model successfully predicted a filter cake thickness which agrees well with measurements and previous CFD work.