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CFD modelling of liquid-solid transport in the horizontal eccentric annuli. SNEHA SAYINDLA, NIRANJAN REDDY CHALLABOTLA, Norwegian University of Science and Technology — In oil and gas drilling operations, different types of drilling fluids are used to transport the solid cuttings in an annulus between drill pipe and well casing. The inner pipe is often eccentric and flow inside the annulus can be laminar or turbulent regime. In the present work, Eulerian-Eulerian granular multiphase CFD model is developed to systematically investigate the effect of the rheology of the drilling fluid type (Newtonian and non-Newtonian), drill pipe eccentricity and inner pipe rotation on the efficiency of cuttings transport. Both laminar and turbulent flow regimes were considered. Frictional pressure drop is computed and compared with the flow loop experimental results reported in the literature. The results confirm that the annular frictional pressure loss in a fully eccentric annulus are significantly lesser than the concentric annulus. Inner pipe rotation improve the efficiency of the cuttings transport in laminar flow regime. Cuttings transport velocity and concentration distribution were analysed to predict the different flow patterns such as stationary bed, moving bed, heterogeneous and homogeneous bed formation.

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