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# Simulation of Nano Drilling Fluid in an Extended Reach Well

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**Abstract :** Since nano particles have been assessed as thermo stabilizer, rheology enhancer, and ecology safer, nano drilling fluid can be utilized to overcome the complexity of hole cleaning in highly deviated interval of an extended reach wells. The eccentric annular flow is a flow with special considerations; it forms a vital part of drilling fluid flow analysis in an extended reach wells. In this work eccentric, dual phase flow (different types of rock cuttings with different size were blended with nano fluid) through horizontal well (an extended reach well) are simulated with the help of CFD, Fluent package. In horizontal wells flow occurs in an adverse pressure gradient condition, that makes the particle inside it susceptible to reversed flow. Thus the flow has to be analyzed in a three dimensional manner. Moreover the non-Newtonian behavior of the nano fluid makes the problem really challenging in numerical and physical aspects. The primary objective of the work is to establish a relationship between different flow characteristics with the speed of inner wall rotation. The nano fluid flow characteristics include swirl of flow and its effect on wellbore cleaning ability , wall shear stress and its effect on fluid viscosity to suspend and carry the rock cuttings, axial velocity and its effect on transportation of rock cuttings to the wellbore surface, finally pressure drop and its effect on managed of drilling pressure. The importance of eccentricity of the inner cylinder has to be analyzed as a part of it. Practical horizontal well flows contain a good amount of particles (rock cuttings) with moderate axial velocity, which verified nano drilling fluid ability of carrying and transferring cuttings particles in the highly deviated eccentric annular flow is also of utmost importance.

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