Prediction of Stand Pipe Pressure Using Conventional Approach

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Abstract

In rotary drilling operation, the hydraulic circuit typically consists of stand pipe, rotary hose, swivel, Kelly, drill pipe, drill collar, drill bit and the annulus between the drillstring and the open hole or the casing. Stand Pipe Pressure, abbreviated as SPP, is defined as the total frictional pressure drop in the hydraulic circuit. SPP, an important drilling parameter in selecting proper mud weight, can be calculated using different rheological models. In this paper, the results obtained using the four widely used rheological models namely the Newtonian model, the Bingham plastic model, the Power law model and the Herschel-Bulkley model are presented. The rheological data used are collected by performing circulation test while drilling a vertical well in the Po valley, Italy. The rheological constants associated with each of the four models are calculated using regression analysis over all the six Fann viscometer readings obtained for the water based mud used. For the three flow rates used during the circulation test, SPP has been predicted with a maximum error of 1.2% when compared with the measured values. The Bingham plastic model produces best SPP estimates for all the three flow rates for the drilling condition considered.

Keywords: SPP, rheological models, frictional pressure drop

DOI = 10.3329/cerb.v13i1.2703

Chemical Engineering Research Bulletin 13 (2009) 7-11

References

Full Text: PDF

Chemical Engineering Research Bulletin ISSN Print:0379-7678 Online:2072-9510

Indexed by *Chemical Abstract Service (CAS)*, *CEABA-VtB*, *Google Scholar* and *DOAJ*

BanglaJOL is supported by INASP

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