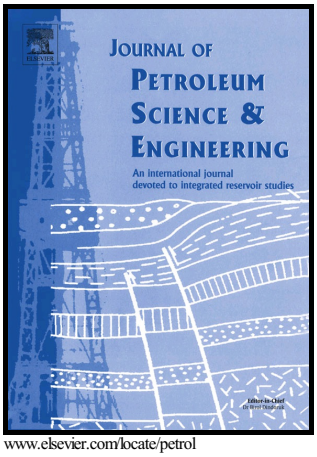

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PII: S0920-4105(16)30273-X
DOI: http://dx.doi.org/10.1016/j.petrol.2016.07.022
Reference: PETROL3555

To appear in: *Journal of Petroleum Science and Engineering*

Received date: 17 August 2015
Revised date: 24 June 2016
Accepted date: 8 July 2016

Cite this article as: Erman Ulker and Mehmet Sorgun, Comparison o Computational Intelligence Models For Cuttings Transport in Horizontal an Deviated Wells, *Journal of Petroleum Science and Engineering* http://dx.doi.org/10.1016/j.petrol.2016.07.022

Comparison of Computational Intelligence Models For Cuttings Transport in Horizontal and Deviated Wells

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Abstract

Improper cleaning of the horizontal and deviated wellbores is one of the major problems encountered during drilling process. Cuttings bed thickness is a key parameter to determine hole cleaning. In this study, computational intelligence techniques including k-Nearest Neighbor (kNN), Support Vector Regression (SVR), Linear Regression and Artificial Neural Network (ANN) were employed to estimate cuttings bed thickness inside a wellbore with and without drill pipe rotation. Cuttings transport measurements for hole inclinations from horizontal to 60 degrees, rates of penetration from 0.0013 to 0.0038 m/s, flow velocities from 0.64 m/s to 1.59 m/s, and pipe rotations from 0 to 120 rpm were recorded to train the computational intelligence techniques. More than three hundred different datasets were performed and corresponding cuttings bed thickness values were obtained. The prediction results of computational intelligence techniques were satisfactory, when compared with experimental data. A t-test was conducted and insignificant difference between experimental and predicted data was concluded. ANN provided slightly better performance than the other models when they were compared with their RMSE, AAE,