عنوان مقاله:

Bayesian prediction of rotational torque to operate horizontal drilling

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خلاصه مقاله:

Horizontal directional drilling is usually used in drilling engineering. In a variety of conditions, it is necessary to predict the torque required for performing the drilling operation. Nevertheless, there is presently not a convenient method available to accomplish this task. In order to overcome this difficulty, the current work aims at predicting the required rotational torque (RT) to operate horizontal directional drilling on the 7 effective parameters including the length of drill string in the borehole (L), axial force on the cutter/bit (P), total angular change of the borehole (KL), radius for the ith reaming operation (Di), rotational speed (rotation per minute) of the bit (N), mud flow rate (W), and mud viscosity (V). In this paper, we propose an approach based on the model selection criteria such as various statistical performance indices mean squared error (MSE), variance account for (VAF), root mean squared error (RMSE), squared correlation coefficient (R2), and mean absolute percentage error (MAPE) to select the most appropriate model among a set of 20 candidate ones to estimate RT, given a set of observed data. Once the most appropriate model is selected, a Bayesian framework is employed to develop the predictive distributions of RT, and to update them with new project-specific data that significantly reduce the associated predictive uncertainty. Overall, the results obtained indicate that the proposed RT model possesses a satisfactory predictive performance.

کلمات کلیدی:

Rotational Torque, Horizontal Directional Drilling, Bayesian Analysis, Prediction

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