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# Estimation of Constant Coefficients of Bourgoyne and Young Drilling Rate Model for Drill Bit Wear Prediction

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**Abstract :** In oil and gas well drilling, the drill bit is an important part of the Bottom Hole Assembly (BHA), which is installed and designed to drill and produce a hole by several mechanisms. The efficiency of the bit depends on many drilling parameters such as weight on bit, rotary speed, and mud properties. When the bit is pulled out of the hole, the evaluation of the bit damage must be recorded very carefully to guide engineers in order to select the bits for further planned wells. Having a worn bit for hole drilling may cause severe damage to bit leading to cutter or cone losses in the bottom of hole, where a fishing job will have to take place, and all of these will increase the operating cost. The main factor to reduce the cost of drilling operation is to maximize the rate of penetration by analyzing real-time data to predict the drill bit wear while drilling. There are numerous models in the literature for prediction of the rate of penetration based on drilling parameters, mostly based on empirical approaches. One of the most commonly used approaches is Bourgoyne and Young model, where the rate of penetration can be estimated by the drilling parameters as well as a wear index using an empirical correlation, provided all the constants and coefficients are accurately determined. This paper introduces a new methodology to estimate the eight coefficients for Bourgoyne and Young model using the gPROMS parameters estimation GPE (Version 4.2.0). Real data collected form similar formations (12 ¼’ sections) in two different fields in Libya are used to estimate the coefficients. The estimated coefficients are then used in the equations and applied to nearby wells in the same field to predict the bit wear.

**Keywords :** Bourgoyne and Young model, bit wear, gPROMS, rate of penetration
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