عنوان مقاله:

Statistical Analysis and Optimization of Drilling Process using Response Surface Methodology and Experimental Data

محل انتشار:

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خلاصه مقاله:

It is well-established that the response surface methodology (RSM) is commonly employed to establish the differences between the predicted values and those observed experimentally. This study mainly goals on the impact of four drilling factors including weight on the bit (WOB), the rotating rapidity of the bit, RPM, cutting angle , and rock resistance on the penetration rate of the drilling tool. In this examination, three kinds of limestone rocks were considered. The planned assessments were carried out at three stages of the considered four input variables. The statistical analysis was realized using both RSM approach and analysis of variance (ANOVA). This analysis allowed us to develop the appropriate penetration model with a higher determination coefficient of ۹۶.۱۹%, which demonstrates the high correlation between the predicted and experimental data, and consequently, it can be concluded that the obtained model is highly suitable for the prediction of the penetration rate. Also from variance analysis, the results obtained show that rotational speed, RPM, and weight on the bit (WOB) parameters, as well as the nature of the rock, which is determined by the rock compressive resistance, having a significant effect on the penetration rate; however, the rake angle has little effect. Finally, the optimal parameters were determined to find the best possible penetration rate of .the drilling tool

کلمات کلیدی:

Optimization, Experimental data, Drilling Parameters, Optimal parameters, RMS and ANOVA