

Main Control Factors of Fluid Loss in Drilling and Completion in Shunbei Oilfield by Unmanned Intervention Algorithm

Authors : Peng Zhang, Lihui Zheng, Xiangchun Wang, Xiaopan Kou

Abstract : Quantitative research on the main control factors of lost circulation has few considerations and single data source. Using Unmanned Intervention Algorithm to find the main control factors of lost circulation adopts all measurable parameters. The degree of lost circulation is characterized by the loss rate as the objective function. Geological, engineering and fluid data are used as layers, and 27 factors such as wellhead coordinates and WOB are used as dimensions. Data classification is implemented to determine function independent variables. The mathematical equation of loss rate and 27 influencing factors is established by multiple regression method, and the undetermined coefficient method is used to solve the undetermined coefficient of the equation. Only three factors in t-test are greater than the test value 40, and the F-test value is 96.557%, indicating that the correlation of the model is good. The funnel viscosity, final shear force and drilling time were selected as the main control factors by elimination method, contribution rate method and functional method. The calculated values of the two wells used for verification differ from the actual values by -3.036m³/h and -2.374m³/h, with errors of 7.21% and 6.35%. The influence of engineering factors on the loss rate is greater than that of funnel viscosity and final shear force, and the influence of the three factors is less than that of geological factors. Quantitatively calculate the best combination of funnel viscosity, final shear force and drilling time. The minimum loss rate of lost circulation wells in Shunbei area is 10m³/h. It can be seen that man-made main control factors can only slow down the leakage, but cannot fundamentally eliminate it. This is more in line with the characteristics of karst caves and fractures in Shunbei fault solution oil and gas reservoir.

Keywords : drilling and completion, drilling fluid, lost circulation, loss rate, main controlling factors, unmanned intervention algorithm

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