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# Analysing the Interactive Effects of Factors Influencing Sand Production on Drawdown Time in High Viscosity Reservoirs

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**Abstract :** The challenges that sand production presents to the oil and gas industry, particularly while working in poorly consolidated reservoirs, cannot be overstated. From restricting production to blocking production tubing, sand production increases the costs associated with production as it elevates the cost of servicing production equipment over time. Production in reservoirs that present with high viscosities, flow rate, cementation, clay content as well as fine sand contents is even more complex and challenging. As opposed to the one-factor at a-time testing, investigating the interactive effects arising from a combination of several factors offers increased reliability of results as well as representation of actual field conditions. It is thus paramount to investigate the conditions leading to the onset of sanding during production to ensure the future sustainability of hydrocarbon production operations under viscous conditions. We adopt the Design of Experiments (DOE) to analyse, using Taguchi factorial designs, the most significant interactive effects of sanding. We propose an optimized regression model to predict the drawdown time at sand production. The results obtained underscore that reservoirs characterized by varying (high and low) levels of viscosity, flow rate, cementation, clay, and fine sand content have a resulting impact on sand production. The only significant interactive effect recorded arises from the interaction between BD (fine sand content and flow rate), while the main effects included fluid viscosity and cementation, with percentage significances recorded as 31.3%, 37.76%, and 30.94%, respectively. The drawdown time model presented could be useful for predicting the time to reach the maximum drawdown pressure under viscous conditions during the onset of sand production.

**Keywords :** factorial designs, DOE optimization, sand production prediction, drawdown time, regression model
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