

Displacement Efficiency in Cementing– Numerical and Experimental Results

Challenge

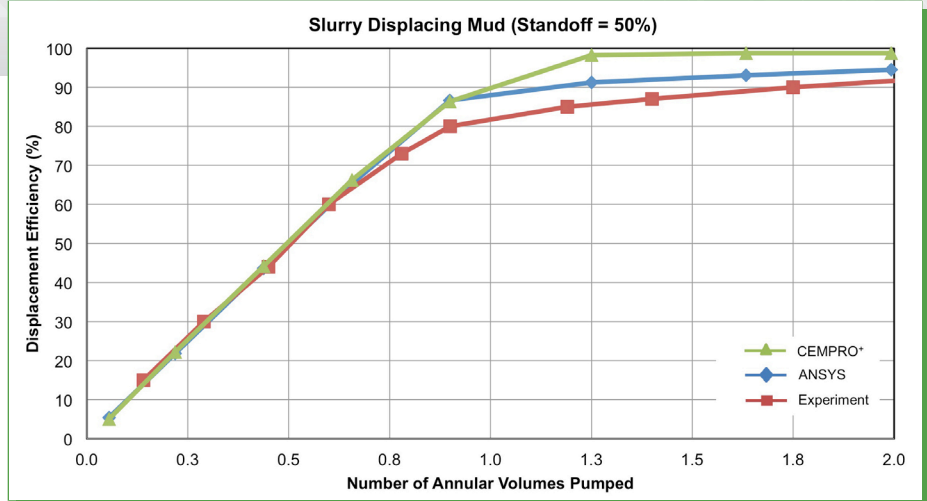
Verify computer modeling of displacement efficiency in cementing job.

Solution

Compare CEMPRO simulation results with a leading CFD model (ANSYS) and published experimental work.

Results

CEMPRO, ANSYS, and experimental data show closely matching displacement–efficiency results.



Both ANSYS and CEMPRO predict similar displacement efficiencies, and their numerical results are in good agreement with the experimental work.

CEMPRO, LINQX's cementing job model, uses a finite-volume method to predict displacement efficiency. It balances the accuracy of full-scale computational fluid dynamics (CFD) models and the speed for practical job design.

ANSYS CFD provides comprehensive fluid-flow analysis and is widely accepted for its accuracy. However, general-purpose CFD like ANSYS can be applied to many areas, set up and execution are time consuming. A single simulation may take hours depending on complexity.

This case study compares results from CEMPRO, ANSYS, and the experimental works conducted by Tehrani et al (SPE 24569). Both ANSYS and CEMPRO predict similar displacement efficiencies, and their results align well with the experimental observations. In cases where the pumped volume is less than one annular volume (typical for cementing jobs), the simulated and measured outcomes are nearly identical.

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