

Displacement Efficiency in Cementing - Numerical and Experimental Results

CHALLENGE

Verify computer modeling of displacement efficiency in cementing job.

SOLUTION

Compare simulation results with leading edge computational fluid dynamics (CFD) model and experimental work.

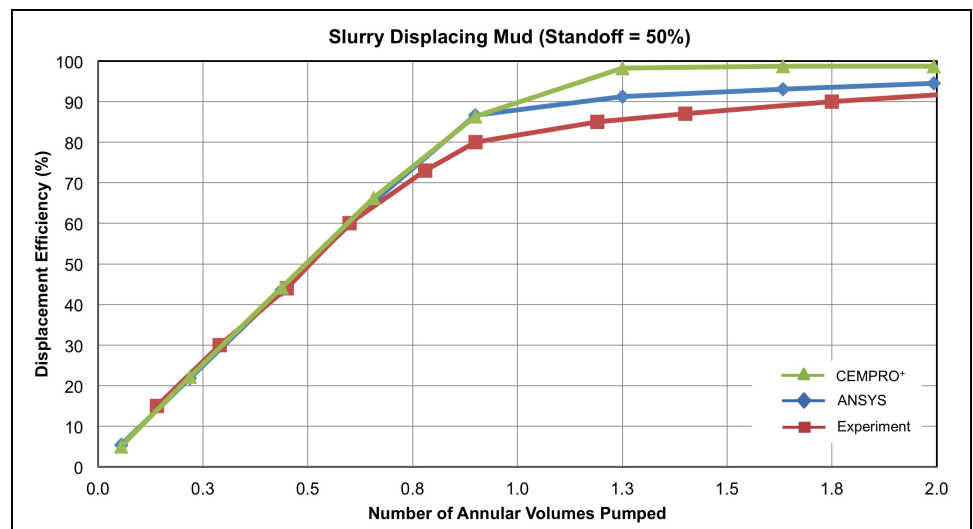
RESULTS

Closely matching results between CEMPRO+, ANSYS and experimental work were found.

Pegasus Vertex, Inc.'s [Mud Displacement Software, CEMPRO+](#), uses a finite volume method to predict displacement efficiency. It balances the accuracy of a full-scale CFD model and the speed of simulation.

ANSYS CFD software offers comprehensive fluid flow analysis capabilities and is one of the most accepted and accurate CFD software in the market. Even though, general purpose software like ANSYS can be applied to many areas, set up and execution are time consuming. A single simulation may require hours depending on its complexity.

The following case study* compares the results of CEMPRO+, ANSYS and the experimental works conducted by Tehrani et al (SPE 24569). The findings show that both ANSYS and CEMPRO+ predict similar displacement efficiencies and their numerical simulation results are in good agreement with the experimental work. Additionally, when the volume pumped is less than one annulus volume (typical for cementing job), the calculated results and experimental observation are almost a perfect match.



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* "Parametric Analysis of Efficiency Using An Efficient Mud Displacement Modeling Technique", by Yanfang Wang, Louisiana State University, Dr. Hu Dai, Pegasus Vertex, Inc., 2018 AADE Fluids Technical Conference and Exhibition, April 10-11, 2018, Houston, Texas