SPE 154803 Vertical Lift Models Substantiated by Statfjord Field Data

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A study was carried out to evaluate which multiphase flow correlations are recommended for wells producing with varying flow conditions. The value of matching the multiphase correlations to test data was also investigated.

The data comprised of 80 production tests from four wells from the Statfjord field with varying GLR, WCT and THP.

The testing methodology was as follows;

1. Set up the PROSPER files for the four wells, test the response of the flow correlations/models available within PROSPER against the data available.
2. Analyse the error found for measured vs. predicted for all tests and then eliminate tests where results were indicative of instability.
3. Analyse how the error changes with varying conditions; GLR, THP and WCT.
4. Tested correlation matching strategies; at low GLR, high GLR and to all test data.

Predicted vs. Measured Data

From the study, the best performing correlations for the whole range of conditions were found to be:

- Hagedorn Brown
- Petroleum Experts
- Petroleum Experts 2
- Petroleum Experts 3

They found that there was a trend in increasing error with GLR above $\sim 2000 Sm3/Sm3$. However, even within this, the error was below 5% for the correlations mentioned above. Furthermore, it was found that Gray generally over predicted pressure drop especially in cases with higher GLR. This was contrary to the findings of S. Persad (2005).

Tuning

By using the non-linear regression within PROSPER to match the correlations, the authors found that tuning increases the accuracy of the flow correlation within the GLR range it was tuned to. However, it did not improve the accuracy of the correlation for data outside the range it was tuned to. Given that the experimental error for the tests was larger than the calculated error for most tests, the authors recommended caution in tuning to a single production test.