

Integrated Approach of Retrograde Condensate Simulation Using Pseudo-Pressures with Modified Equation of State and Velocity Dependent Relative Permeability

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Abstract

It is a well-known fact that the deliverability of condensate reservoirs is a function of condensate formation around the wellbore. Thus, accurate estimation of condensate recovery necessitates properly modelled Equation-of-State (EOS) and subsurface flow phenomena. EOS is a function of numerous parameters of the Reservoir and Fluid contained; however it should be kept in mind that it is almost impossible to exactly match all these parameters, while all the parameters don't obligate equal significance as well.

This paper describes the most important parameters in EOS which ultimately control the overall condensate recovery. It involves unique simulation methodology to determine the condensate flow in reservoir using velocity-dependent-relative-permeability (VRP) curves (instead of conventional-relative permeability methods) to determine the effect of velocity stripping near the well bore; and the Pseudo-pressure approach.

The modified form of EOS used in the study, along with the VRP curves features accurate condensate flow in the reservoir and its optimization. Moreover, using the pseudo pressure approach, this paper also signifies the reservoir modelling and forecasting methods with minimum amount of time for simulation.

A complete and comprehensive strategy has been presented in this paper, to infer the factors having max influence on recovery. Using diverse sensitivities, it is evident that four parameters have a high influence; which includes compositional-variation with depth, Liquid drop-out, Condensate viscosity and Compressibility, while the rest yield minimal impact. The VPR models also improve history matching and give better forecast; while using pseudo-pressure approach reduces significant time with negligible impact on the results.