Fluid Properties Characterization for an Iranian Oil Reservoir

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Abstract
Phase behavior characterization for a oil reservoir with an initial gas cap located in south of Iran has been conducted. Peng-Robinson EOS was selected and tuned for this purpose. Conventional PVT experiments were available for 11 wells in the reservoir. Reliable data was recognized by analyzing the experimental data. This reservoir consists of asmari and bangestan formations. The latter indicates that the fluid properties may be not identical through the reservoir. All reliable data was used for tuning a unique EOS for reservoir fluid using Winprop phase behavior package from Computer Modeling Group (CMG).

Key Words: Saturation Pressure; Pseudo component; C7+; Smoothing, EOS

Introduction

One of the important parts of each reservoir study is characterization of reservoir fluids, which in turn has several applications in different branches of reservoir management. A phase package with the help of an Equation Of State (EOS) can be used to evaluate the consistency of measured PVT data or to generate required data for black oil reservoir simulator.

Conventional experiments such as constant composition expansion, differential liberation, were performed for the fluid samples of the reservoir. With respect to the experimental results the overall behavior of the reservoir fluid has to be determined. Prediction of fluid behavior by EOS may be improved by adjusting some EOS parameters and / or fluid properties. This adjustment which usually takes place via a regression routine is known as EOS tuning. Various EOS parameters and fluid properties are supposed as regression variables. These variables will be changed in a manner so that the EOS calculations match the available experimental data.

However different variables have different effects on EOS tuning and also the accuracy of different experimental data are not usually the same, so it is necessary to use different weights for each parameter in order to tune EOS properly. A.R. Behbahaninia [1] has obtained a universal set of weight factors for tuning Peng-Robinson EOS. In this study, fluid properties of saturated oil in a carbonated fracture reservoir located in south of Iran have been analyzed. The fluid behavior has been modeled by fitting Peng-Robinson EOS to experimental data and black oil PVT tables have been generated.

Equation of state

Peng and Robinson [2] modified the attractive term mainly to improve the prediction of liquid density in comparison with Soave-Redlich - Kwong EOS.

$$P = \frac{RT}{V-b} - \frac{a_c\alpha}{V(V+b)+b(V-b)}$$

Where:

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