

Neural network based PVT analysis of Middle East crude reservoirs

Somnath Nandi

Savitribai Phule Pune University, India

The maximization of hydrocarbon recovery from crude reserves is the key challenge of any reservoir and production engineer in order to achieve maximum recovery of the field with smallest expense. Sophisticated instruments are employed for determination of reservoir fluid behaviour and properties from the collected oil and gas samples. The main objective of pressure-volume-temperature (PVT) analysis is to understand how gas evolves from oil when pressure falls below the bubble point. Bubble point is crucial for understanding how hydrocarbons behave in the reservoir and indicates the probable drive mechanisms. Various other properties of crude namely oil viscosity, oil density, compressibility of oil and even the oil formation volume factor etc. may also be correlated to the bubble point of the crude. Thus an error in bubble point pressure will cause errors in estimating all these important oil properties and it may propagate additional errors throughout all reservoir and production engineering calculations. Determination of bubble point pressures of reservoir require following field data:

- a) Reservoir temperature (T in $^{\circ}\text{F}$)
- b) Stock tank oil gravity (in $^{\circ}\text{API}$)
- c) Gas specific gravity (γ_g dimensionless)
- d) Solution gas to oil ratio at the bubble point (R_{sb} scf/STB)

In this study we had developed a neural network (NN) based model to predict bubble point pressure for the crude reservoirs of the UAE and Middle East. The results indicate that NN-based predictions are of reasonable accuracy. The results of this study are compared with the commonly used available PVT correlations to indicate that neural network is an effective alternative for PVT analysis of crude reservoir.

Biography:

Dr. Somnath Nandi is an Associate Professor at Department of Technology, Savitribai Phule Pune University and also associated with Dept. of Petroleum and Petrochemical Eng, Maharashtra Institute of Technology. He has completed B Tech, ME and PhD all in Chemical Engineering. His main research interest is Modelling and Simulation, Flow through porous media, Optimization studies and Renewable Energies. He has published 15 peer reviewed journal papers and more than 50 publications in national and international conferences. He has authored or co-authored 4 book chapters. He is reviewer of couple of international journals.