

Volumetric and Viscosity Modeling of Natural Gas Based on the Friction Theory

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Viscosity and density are key properties for the evaluation, simulation, and development of numerous oil and gas applications. In previous works, the friction theory FT model has been coupled with the popular cubic equations of state (EoS) and, despite their simplicity, these models have been shown to be able to deliver simple but accurate viscosity models. However, the inaccuracy and limitations of the cubic EoS can be severe, particularly for high-pressure applications, and therefore, in such cases, insufficient for some specific applications. Alternatively, the recent generalization of the FT approach allows for its application to practically all types of EoS, including reference and theoretical ones. Consequently, in this work, the generalized FT approach is extended to non-cubic type EoS in order to obtain an improved overall pvT and viscosity modeling of natural gas. The approach is presented for simple natural gas mixtures as well as more complex systems, such as gas condensates, that may require taking into detailed consideration the influence of the heavy fraction for the proper description of the fluid phase behavior.