On the Non-Ideality of Hydrocarbon Fluids: Implications for Natural Gas Engineering - Part A

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Abstract

This work presents a unified treatment of non-ideality that uniquely ties the concepts of compressibility factor, Joule-Thomson coefficient, fugacity coefficient, and fugacity, that are routinely used in natural gas engineering. This development is based on the identification of common misconceptions and the construction of a unified approach for the analysis of non-ideality. Starting with the basic ideal equation of state, an integrated treatment is progressively built, in which the concept of non-ideality is thoroughly reviewed and its implications for natural gas engineering extensively discussed. The treatment of non-ideality given here is unique in scope and non existent in the available natural gas engineering literature. In part A of this two-article series, the concepts of fluid compressibility factor (Z) and fugacity coefficient are reviewed, and a unique graphical interpretation for both is presented. In part B of the series, the implications of non-ideality for natural gas engineering are reviewed and discussed.

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