Title

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Transient Pressure Behavior and Type Curves of Non-Darcy Flow in Porous and Fractured Reservoirs

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Abstract

This paper presents a theoretical study of non-Darcy fluid flow through porous and fractured reservoirs using a numerical modeling approach. In the numerical model, the non-Darcy flow is described by the *Forchheimer* equation, implemented in a three-dimensional, multiphase flow reservoir simulator. The non-Darcy flow through fractured reservoir is handled using a general dual continuum approach, covering commonly used conceptual models, such as double porosity, dual permeability, explicit fracture, etc.

The objectives of this study are (1) to obtain insights into the effect of non-Darcy flow on transient pressure behavior through porous and fractured reservoirs and (2) to provide type curves for well test analyses of non-Darcy flow wells. The type curves generated include various types of drawdown, injection, and buildup tests with non-Darcy flow occurring in porous and fractured reservoirs. In addition, non-Darcy flow into partially penetrating wells is also considered. The transient pressure type curves for flow in fractured reservoirs are based on the double-porosity model. Furthermore, a simple graphic approach for determining formation non-Darcy flow coefficients by well testing is presented.

The type curves provided in this work for non-Darcy flow in porous and fractured reservoirs will find their applications in well test interpretation using the type-curve matching technique. In particular, these curves may be directly used for analyzing non-Darcy flow behavior of production and injection wells in oil and gas reservoirs.