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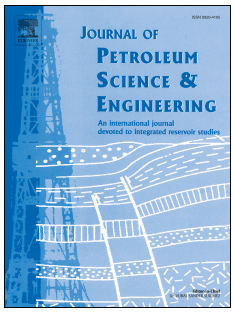

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Composite Linear Flow Model for Multi-Fractured Horizontal Wells in Tight Sand Reservoirs with Threshold Pressure Gradient

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Abstract

Multi-stage fracturing is currently the most effective method to exploit tight sand reservoirs. Various analytical models have been proposed to fast and accurately investigate the post-fracturing pressure- and rate-transient behaviors, and hence, estimate the key parameters that affect well performance. However, these analytical models mainly consider 2D flow, neglecting the fluids flow from upper/lower reservoir when the vertical fractures partially penetrate the reservoir. Although for the linear flow model, Olarewaju et al. (1989) and Azari et al. (1990, 1991) have studied the effects of fracture height, they merely used a skin factor. Moreover, reservoir heterogeneity is seldom included. This paper presents an analytical model for multi-stage fractured horizontal wells (MFHWs) in tight sand reservoirs, accounting for the upper/lower reservoir contributions, reservoir heterogeneity and threshold-pressure gradient (TPG).

The model is extended from the "five-flow-region" model and subdivides the reservoir into seven