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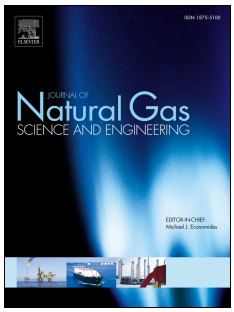


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# An Innovative Model to Evaluate Fracture Closure of Multi-Fractured Horizontal Well In Tight Gas Reservoir Based on Bottom-Hole Pressure



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## Abstract

Due to formation damage and fracture closure, the effective fracture half-length is usually much shorter than the designed half-length. However, available pressure transient analysis (PTA) models of multi-fractured horizontal wells (MFHWs) hardly consider the effect of non-uniform fracture closure of double-segment fractures (DSF) on transient pressure characteristics, which could bring about incorrect results since conductivity and flux density of fracture segment near wellbore are much larger than those of fracture segment far from wellbore. To fill this gap, this paper aims at presenting a novel approach to evaluate effective fracture properties through PTA more accurately. This new model allows each hydraulic fracture of MFHW consists of two individual segments with their own properties (e.g. length, conductivity and flux density, etc). Pressure and its derivative curves are developed for flow-regime analysis. The solution is validated with numerical results in Saphir. Sensitivity analysis further seek the feasible application on interpretation of effective fracture properties. The field application demonstrates the practical use of the proposed model in estimating fracture half-length with different conductivity during production stage to identify the extent of fracture closure using pressure data.

Keywords: multi-fractured horizontal well; fracture closure; double-segment fracture; pressure transient analysis; type curves

## 1. Introduction

Tight gas and shale gas have become the important source of hydrocarbon supply due to environmental issues and the depletion of conventional oil/gas reservoirs (Ji et al. 2017; Wang et al. 2017; Rui et al. 2017a and 2017b; Cui et al. 2018). The application of multi-stage hydraulically fracturing techonology and horizontal well enables commercial production from unconventional oil and gas reservoirs (Clarkson and Williams-Kovacs 2013; Qin et al. 2018a). On the one hand, many research devote to assess reservoir quality (Rui et al. 2017c and 2018), to invetigate fracture propagation (Guo et al. 2017a) and fracture characterization (Tafti and Aminzadeh 2012; Sun et al.