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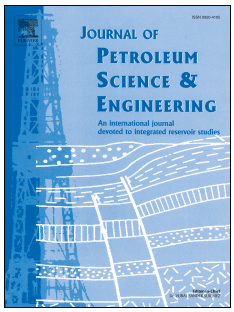

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PII: S0920-4105(17)30653-8

DOI: 10.1016/j.petrol.2017.08.041

Reference: PETROL 4204

To appear in: *Journal of Petroleum Science and Engineering*

Received Date: 25 February 2017

Revised Date: 16 June 2017

Accepted Date: 16 August 2017

Please cite this article as: Li, X.-P., Cao, L.-N., Luo, C., Zhang, B., Zhang, J.-Q., Tan, X.-H., Characteristics of transient production rate performance of horizontal well in fractured tight gas reservoirs with stress-sensitivity effect, *Journal of Petroleum Science and Engineering* (2017), doi: 10.1016/j.petrol.2017.08.041.

Characteristics of transient production rate performance of horizontal well in fractured tight gas reservoirs with stress-sensitivity effect

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Abstract

Interest in tight gas reservoirs (TGR) has quickly spread worldwide. Most researches on the permeability stress-sensitivity of tight gas reservoirs mainly concentrated on experimental approach, physical modeling or pressure behavior analysis, while transient production rate performance does not attract much attention. This study developed a dual-porosity model of a horizontal well in fractured tight gas reservoirs considering the stress-sensitivity effect. The solution methods include variable substitution, perturbation technique, Laplace transformation, Sturm-Liouville eigenvalue theory, orthogonal transformation and numerical inversion. The results showed that the production rate decreases with the increasing of permeability modulus and the derivative curve will be warped up during the whole system late radial flow stage. The influences of other parameters are also analyzed. The work undertaken here has both theoretical and practical significance in predicting production performance and evaluating underground fluid transport in such formations.

Key words

Transient production rate performance; dual-porosity; stress-sensitivity; horizontal well; tight gas reservoir

1. Introduction

Unconventional resources have played an increasingly important role in the energy revolution. Interest in tight gas reservoirs (TGR) has quickly spread worldwide. Numerous studies on the transient flow analysis of unconventional resource have been documented extensively in the literatures. For naturally fractured reservoirs, the most common Warren-Root model was proposed in 1963 (Warren and Root, 1963), as well