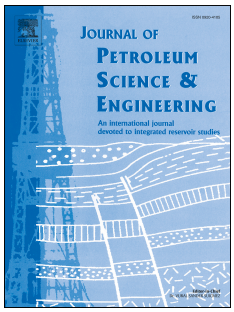
Accepted Manuscript



An Enhanced Discrete Fracture Network model to simulate complex fracture distribution

Mi Lidong, Yan Bicheng, Jiang Hanqiao, An Cheng, Wang Yuhe, E. Killough John

PII: S0920-4105(17)30530-2

DOI: 10.1016/j.petrol.2017.06.035

Reference: PETROL 4047

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

Received Date: 25 February 2017

Revised Date: 2 June 2017

Accepted Date: 14 June 2017

Please cite this article as: Lidong, M., Bicheng, Y., Hanqiao, J., Cheng, A., Yuhe, W., Killough John, E., An Enhanced Discrete Fracture Network model to simulate complex fracture distribution, *Journal of Petroleum Science and Engineering* (2017), doi: 10.1016/j.petrol.2017.06.035.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

An Enhanced Discrete Fracture Network Model to Simulate Complex Fracture Distribution

Authors: Mi, Lidong[a, b, c]; Yan, Bicheng[b]; Jiang, Hanqiao[a]; An, Cheng[b]; Wang, Yuhe[d, *]; Killough, John E.[b]

a Department of Petroleum Engineering, China University of Petroleum (Beijing), Beijing, China
b Sinopec Petroleum Exploration and Production Research Institute, Beijing, China
c Department of Petroleum Engineering, Texas A&M University, College Station, TX, USA
d Department of Petroleum Engineering, Texas A&M University at Qatar, Doha, Qatar

* Corresponding Author: Yuhe Wang, yuhe.wang@qatar.tamu.edu

Abstract

This paper presents an approach called, **E**nhanced **D**iscrete **F**racture **N**etwork (**EDFN**) for fractured reservoirs modeling. The purpose of this approach is to efficiently represent complex fracture network and accurately simulate the fluid exchange between matrix and fracture. In this approach, fracture network is discretized with a minimum number of grids depending on the fracture intersecting points and fracture extremities. Besides, fracture network naturally decomposes matrix into coarse-scale block with variable geometries, and the partition is optimized by a rapid image processing algorithm. Each coarse matrix block is locally associated with a fracture grid, and it is equivalently discretized to rectangular fine-scale grid blocks. Fine-scale grid blocks are communicated with local fracture grids through one-dimensional flow transport. Therefore, the EDFN model maximally optimizes the discretization process for fractured reservoirs, and it is very appropriate for the simulation of reservoirs with arbitrarily oriented interconnected fractures. Through benchmark with different grid discretization approaches, the EDFN model provides very consistent results and its accuracy is validated. Besides, we also demonstrate that the EDFN model is able to simulate fractured reservoirs with a much smaller number of grid blocks than other approaches. Finally different non-Darcy flow mechanisms in shale gas reservoirs are incorporated into the EDFN model and the impact of those flow mechanisms are investigated.

1. Introduction

The great challenges to study the fluid flow in fractured reservoirs lie in two aspects, detailed representation the complex fracture network and accurate simulation of the matrix-fracture fluid exchange (Sarda et al., 2001). In the past several decades many researchers have focused on fractured reservoirs simulation. The Dual-Porosity Model is a typical Multi-Continuum Approach (MCA). It was originally proposed by Barenblatt et al. (Barenblatt et al., 1960) and introduced to petroleum industry for fractured reservoirs by Warren and Root (Warren and Root, 1963). Later

Download English Version:

https://daneshyari.com/en/article/5484127

Download Persian Version:

https://daneshyari.com/article/5484127

Daneshyari.com