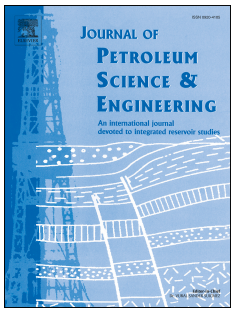
Accepted Manuscript



Numerical analysis of production rate based on interaction between induced and natural fractures in porous media

Jaber Taheri-Shakib, Amir Ghaderi, Vahid Kanani, Mahyar Rajabi-Kochi, Seyed Ahmad Hosseini

PII: S0920-4105(16)31191-3

DOI: 10.1016/j.petrol.2018.02.015

Reference: PETROL 4685

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

Received Date: 6 December 2016

Revised Date: 26 January 2018

Accepted Date: 7 February 2018

Please cite this article as: Taheri-Shakib, J., Ghaderi, A., Kanani, V., Rajabi-Kochi, M., Hosseini, S.A., Numerical analysis of production rate based on interaction between induced and natural fractures in porous media, *Journal of Petroleum Science and Engineering* (2018), doi: 10.1016/j.petrol.2018.02.015.

Numerical analysis of production rate based on interaction between induced and natural fractures in porous media

Jaber Taheri-Shakib[1], Amir Ghaderi[2], Vahid Kanani[3], Mahyar Rajabi-Kochi[4], Seyed Ahmad Hosseini[5]

[1] Research Institute of Petroleum Industry, Department of Research and Technology of the rock and fluid reservoirs, Tehran, Iran

[2]Petroleum Engineering Department, Petroleum University of Technology, Ahwaz, Iran

[3]National Iranian South Oil Company, Reservoir Engineering Department, Ahwaz, Iran

[4]Department of petroleum engineering, Amirkabir University of technology, Tehran, Iran

[5]Department of Environment, Land and Infrastructure Engineering, Politecnico di Torino, Turin, Italy

Abstract

Hydraulic fracturing in reservoirs with low or high fracture density could have a significant impact on the reservoirs' production rate. In the present study, having determined the fracture direction through the finite difference method according to the induced-stress distributions, this operation simulated fracturing in two reservoirs with high or low levels of natural fracturing, using the distinct-element method. The goal was to investigate the effect of hydraulic fracture length and aperture on the production rate from both reservoirs. Sensitivity analysis indicated that in a reservoir with more natural fractures, hydraulic fracture length plays a more significant role, and in a reservoir with fewer natural fractures, both hydraulic fracture length and opening are highly influential. Also, factors such as fracture coalescence and intersected fractures, which influence the production rate, were examined. Moreover, the results revealed that when the fracture length and aperture increase, the production rate fluctuates.

Keywords: Hydraulic fracture; Natural fracture; Production; XFEM; UDEC.

1. Introduction

When part of the reservoir near a well is damaged (for example, during drilling), some parts of the reservoir rock adjacent to the well are also damaged due to the presence of drilling mud and the operating conditions. For example, drilling mud closes the rock pores and reduces