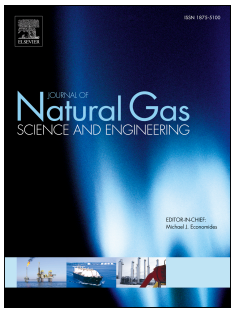
Accepted Manuscript



Considering the regional tectonic state and poro-thermo-elasticity analysis of near wellbore zone in field development plan: Uncoupled approach

Mohammad F. Ghasemi, Mehdi Mehrpouya, Mohammad M. Ghiasi, Amir H. Mohammadi, Sohrab Zendehboudi

PII: S1875-5100(17)30267-6

DOI: 10.1016/j.jngse.2017.06.021

Reference: JNGSE 2219

To appear in: *Journal of Natural Gas Science and Engineering*

Received Date: 21 November 2016

Revised Date: 14 June 2017

Accepted Date: 17 June 2017

Please cite this article as: Ghasemi, M.F., Mehrpouya, M., Ghiasi, M.M., Mohammadi, A.H., Zendehboudi, S., Considering the regional tectonic state and poro-thermo-elasticity analysis of near wellbore zone in field development plan: Uncoupled approach, *Journal of Natural Gas Science & Engineering* (2017), doi: 10.1016/j.jngse.2017.06.021.

Considering the Regional Tectonic State and Poro-Thermo-Elasticity Analysis of Near Wellbore Zone in Field Development Plan: Uncoupled Approach

Mohammad F. Ghasemi,[a] Mehdi Mehrpouya,[b] Mohammad M. Ghiasi,[c,*] Amir H. Mohammadi,[c,e,*] Sohrab Zendehboudi,[f]

[a] Schmidt Institute of Physics of the Earth, Russian Academy of Sciences, Bolshaya Gruzinskaya, 10-1 Moscow 123242, Russia [1]

[b] Department of Renewable Energies and Environmental Engineering, Faculty of New Sciences and Technologies, University of Tehran, North Kargar Avenue, Tehran, Iran

[c] Discipline of Chemical Engineering, School of Engineering, University of KwaZulu-Natal, Howard College Campus, King George V Avenue, Durban 4041, South Africa

[e] Institut de Recherche en Génie Chimique et Pétrolier (IRGCP), Paris Cedex, France

[f] Department of Process Engineering (Oil & Gas Program), Faculty of Engineering and Applied Science, Memorial University, St. John's, NL, Canada

Abstract_ The main aim of this work is to investigate the effect of temperature and pore pressure on stability of wellbore wall considering the wellbore spatial orientation and regional tectonic state of the field in which the well is drilled. An uncoupled approach has been selected for modeling. Although the interacting of fluid and temperature diffusion can be intensely alter the pore pressure and temperature state of the near wellbore zone uncoupled approach can be also considered as a primary, fast and simple method for optimization of field development strategies at the earliest stages of field development when the technical data to run a coupled simulation is limited. The source data used for this study has been collected from real, literature and simulation cases. The real data are from geological and geophysical studies of gas reservoirs in Siberia, Russia. The results show that the problem of wellbore breakout (shear failure) rises in final stages of field development however, the hydraulic fracturing and fluid loss (tensile failure) is more probable at the early stages of field development. Increasing wellbore temperature increases the shear failure risk for any wellbore orientation and regional tectonic state and decreases the risk of tensile failure by increasing the tensile strength of rock. Effect of zenith angle on shear and tensile failure of wellbore depends on regional fault regime. At the regions with normal fault regime, vertical wellbores are more stable than horizontal and vice-versa for strike-slip cases. For reverse fault regime there is an optimum wellbore zenith angle where the shear failure is minimum and tensile failure is maximum. The results are further considered not only from drilling point of view but also for hydraulic fracturing job and hot fluid injection in field production life. Real well data from gas condensate reservoir in normal fault regime was provided to compare the predictions and real incidents during drilling.

Keywords – Wellbore stability; pore pressure; temperature; elastic modeling.

* Corresponding authors: Email: mm.ghiasi@gmail.com & a.h.m@irgcp.fr and amir_h_mohammadi@yahoo.com