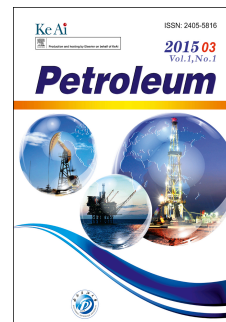


# Accepted Manuscript

Cross-Flow Analysis of Injection Wells in a Multilayered Reservoir

Mohammadreza Jalali, Jean-Michel Embry, Francesco Sanfilippo, Frederic J. Santarelli, Maurice B. Dusseault



PII: S2405-6561(16)30001-3

DOI: [10.1016/j.petlm.2016.05.005](https://doi.org/10.1016/j.petlm.2016.05.005)

Reference: PETLM 83

To appear in: *Petroleum*

Received Date: 3 March 2016

Revised Date: 23 May 2016

Accepted Date: 25 May 2016

Please cite this article as: M. Jalali, J.-M. Embry, F. Sanfilippo, F.J. Santarelli, M.B. Dusseault, Cross-Flow Analysis of Injection Wells in a Multilayered Reservoir, *Petroleum* (2016), doi: 10.1016/j.petlm.2016.05.005.

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.

## Cross-Flow Analysis of Injection Wells in a Multilayered Reservoir

Mohammadreza Jalali<sup>a,\*</sup>, Jean-Michel Embry<sup>b</sup>, Francesco Sanfilippo<sup>c</sup>, Frederic J. Santarelli<sup>c</sup>, Maurice B. Dusseault<sup>d</sup>

<sup>a</sup> *Geological Institute, ETH Zurich, Zurich, Switzerland*

<sup>b</sup> *Baker Hughes, Aberdeen, United Kingdom*

<sup>c</sup> *Geomec Environmental Management AS, Stavanger, Norway*

<sup>d</sup> *Earth & Environmental Sciences Department, University of Waterloo, Waterloo, ON, Canada*

### Abstract

During fluid injection into a multilayered reservoir, a different pressure gradient is generated across the face of each permeable layer. This pressure gradient generates driving forces in the wellbore during well shut-in that causes the injected fluid moves from higher pressure layers to lower pressure layers, a phenomenon known as interwell cross-flow. Cross-flow behavior depends on the initial pressure in the permeable layers and may be referred to as natural cross-flow (identical or natural initial pressures) and forced cross-flow (different initial pressures because of exploitation). Cross-flow may induce sand production and liquefaction in the higher pressure layers as well as formation damage, filter cake build-up and permeability reduction in the lower pressure layers. Thus, understanding cross-flow during well shut-in is important from a production and reservoir engineering perspective, particularly in unconsolidated or poorly consolidated sandstone reservoirs.

Natural and forced cross-flow is modeled for some injection wells in an oil reservoir located at North Sea. The solution uses a transient implicit finite difference approach for multiple sand layers with different permeabilities separated by impermeable shale layers. Natural and forced cross-flow rates for each reservoir layer during shut-in are calculated and compared with different production logging tool (PLT) measurements. It appears that forced cross-flow is usually more prolonged and subject to a higher flow rate when compared with natural cross-flow, and is thus worthy of more detailed analysis.

### Keywords:

cross-flow, multilayered, sandstone reservoir, sand production, skin factor

---

\* Corresponding author.

Address: NO F27, Sonneggstrasse 5, 8092 Zurich, Switzerland

Tel: +41 44 633 81 76

E-mail address: jalalim@ethz.ch

Download English Version:

<https://daneshyari.com/en/article/5026549>

Download Persian Version:

<https://daneshyari.com/article/5026549>

[Daneshyari.com](https://daneshyari.com)