

Paper Number 66372
Title **Representation of Crossflow Effects in Advanced Wells in a Multipurpose Reservoir Simulator**
Authors Y. Caillabet, IFP; P. Fabrie, U. of Bordeaux; P. Lemonnier, R. Masson, O. Ricois, IFP
Source SPE Reservoir Simulation Symposium, 11-14 February, Houston, Texas

Copyright 2001, Society of Petroleum Engineers Inc.

Abstract

Wellbore crossflow can have an important effect on the well production in highly stratified reservoirs. This phenomenon may also appear using EOR techniques or in advanced wells. In those cases, crossflow must be accurately represented and shutting the crossflowing layers may create significant errors on the forecast production and severe numerical problems.

This paper describes the method which has been implemented in an all-purpose reservoir simulator. Our method handles both Black Oil and compositional models in a fully implicit scheme. The wells are discretized in different segments where pressure and compositions are determined. These segments generally correspond to the perforated reservoir cells. The wellbore equations are decoupled from the main Newton resolution for CPU time reduction reasons. The characteristic time-scales in the reservoir and the wells are very different, i.e. the well variables vary more rapidly than the reservoir ones. To ensure good simulation times, cheap computations are made on the wells to reach a pseudo steady state prior to the Newton resolution.

The crossflow model is used on both vertical and horizontal wells and also multilateral wells. Well control can be managed using the build-in algorithms that have been extended to crossflowing wells.

Simulation runs showing the accuracy and reliability of the crossflow modelling are presented. The numerical solution is compared with the results from other studies and with a semi analytical method.