

Paper Number 78489

Title **An Integrated Workflow to Account for Multi-Scale Fractures in Reservoir Simulation Models: Implementation and Benefits**

Authors Bernard Bourbiaux, Remy Basquet, Marie-Christine Cacas, Jean-Marc Daniel, Institut Français du Pétrole; Sylvain Sarda, Beicip-Franlab

Source Abu Dhabi International Petroleum Exhibition and Conference, 13-16 October, Abu Dhabi, United Arab Emirates

Copyright 2002,. Society of Petroleum Engineers Inc.

### **Abstract**

The recent years have seen the emergence of detailed field data acquisition and efficient modelling tools to characterize reservoirs and model their complex internal structure in a realistic way. This progress led to the detection of multi-scale fractures in most reservoirs, and enabled to interpret unexpected field production features such as early breakthroughs. Therefore, the availability of a workflow and an integrated modelling methodology becomes more and more crucial to take into account the geological information about fractures/faults into the reservoir dynamic simulation process for optimizing field productivity and reserves. This paper reviews and illustrates the overall methodology and the specifically-involved procedures and tools we have gradually built from the experience acquired in various fractured field case studies.

The main steps of this multidisciplinary approach include (a) the detection, geological analysis and modeling of multiscale natural fracture network from seismic and well data, (b) its validation and calibration from dynamic field information such as well tests, (c) the choice of an equivalent simulation model applicable at reservoir scale, and its construction thanks to innovative flow up-scaling procedures applied to the realistic model provided by the geologist, (d) the implementation of predictive and numerically-efficient algorithms to represent the physics of flow transfers occurring both at local and large scale during multiphase field production.

Thanks to this consistent workflow, field simulation models remain interpretable in geological terms, which is helpful for subsequent model updating. Thus, specialists in geosciences and reservoir engineers can cooperate in a very effective way to improve the management of fractured reservoirs.