Integrated Fracture Modeling of a Highly Faulted Recumbent Anticline for EOR Simulation of a Heavy Oil Field in Colombia

Alexey Romanov[1], Jan Witte[2], Frank Sorensen[1], Martin Mantilla[3], Jorge Falla[3], Diana Perez[3]

[1]Sproule, Calgary, Alberta, Canada
[2]Consultant, Calgary, Alberta, Canada
[3]Hocol S.A., Bogota, Columbia, South America

Abstract

The impact of fracture network on the reservoir performance can range from very restricted to fully controlling the fluid flow. This impact depends on many factors including but not limited to the type of fracture fill, fracture density, fracture geometry etc. A case study is presented to demonstrate an approach of integrating data from different sources for building a dual porosity-dual permeability model for EOR simulation. This paper illustrates the workflow for static characterisation of fractured reservoirs. The described methodology includes the following steps:

1. A “conventional” static reservoir model which includes lithofacies, porosity, saturation and matrix permeability properties is built first.
2. The next step is statistical analysis where fracture sets are identified. For each fracture set, fracture intensity, i.e. number of fractures per unit of distance, is computed and used as the primary variable about fracturing.
3. Then geological, structural or lithological factors that can be used to propagate fractures away from the wells are selected and fracture intensities are modeled in 3D space. The integration with the secondary variables is done by co-kriging.
4. Finally, fracture properties are computed through discrete fracture modeling.