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Title **Fracture Flow Property Identification: An Optimized Implementation of Discrete Fracture Network Models**

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Proposal

The hydraulic characterization of naturally fractured reservoirs is a key point to provide valid flow properties to full-field simulation models. This calibration and validation step is based on the simulation of dynamic data such as flowmeter, transient or interference well tests. Recently, a methodology has been proposed to simulate such tests on Discrete Fracture Network (DFN) models derived from field fracture data integration. However, the drainage area of a well test in a fractured reservoir is generally large, thus leading to numerous computation nodes, especially in the presence of dense fracture networks. In such situations, the CPU time required for a single well test simulation for instance can reveal itself prohibitive.

This paper proposes an original approach to simplify the DFN model in order to reduce drastically the number of fracture nodes, while keeping the same hydraulic properties. This approach keeps the actual fracture network geometry close to the well and replaces the fracture network far from the well by a simplified discrete fracture network. This DFN simplification is performed through an homogenization procedure keeping the same matrix-fracture storativity ratio and interporosity flow parameter. A sensitivity study was carried out to define the area around the wellbore where the fracture network can be simplified. We also defined a connectivity criterium to ensure a representative flow coupling between the actual near-well fracture network and the simplified distant network.

Well tests simulations on this innovative DFN model are compared with simulations on the actual dense fracture network. Then we considered a 3D problem of well testing in a realistic field context. For both cases, the well test signature is not affected by the DFN simplification procedure, but the computation time is reduced drastically, by nearly two orders of magnitude (from 1 hour to 5 minutes CPU for instance). These tests illustrate the major contribution of this new approach. Actually, numerical flow simulation on DFN models can now be carried out at the well drainage area scale and thus be used to tune the field-measured well tests responses: a determinant step to validate the fracture network geometry derived from geological data and to identify fracture conductivities.