Integrated Modeling Workflow for an Explicit Representation of the Fracture Network: Present Limitations and Perspectives

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Fractured reservoirs which produce only from fracture corridors require a deterministic fault network characterization in order to model equivalent properties at field scale, forecast flow behavior of those large conductive features and optimize a development plan, maximizing productivity while delaying watercut. Modeling of the main structural heterogeneities with respect to the fluid flow behavior is a key issue which requires integration of geophysical, geological and production results early. Also the higher the resolution for fractures both in wells and in seismic the better the 3-D characterization, and the applicability of high-tech modeling software. A pluridisciplinary approach is an asset but software tools have difficulties handling multiple scales and simplification is required: • Outcrop analogs add value to the understanding of the field characteristics if the tectonic history and setting are similar. • Specific DST derivative slopes characterizing large conductive objects also provide essential but limited additional information such as distance to well and magnitude of the flow parameters. The two complementary types: • Genetic models, which aim at predicting the fracture network distribution and properties at field scale from the stress field and the rock mechanical properties, • Stochastic models, such as DFN, (which honor data observed at wells, field average behaviors and trends but have limited capability in predicting fracture occurrence and flow behavior at local scale, especially for large objects such as fault or fracture corridors), are reviewed showing their pitfalls in the light of the integrated workflow constraint up to the test simulation to validate equivalent flow properties of the DFN scenarios. Perspectives are proposed in the framework of integration of data at all scales coming from both static and dynamic sources.