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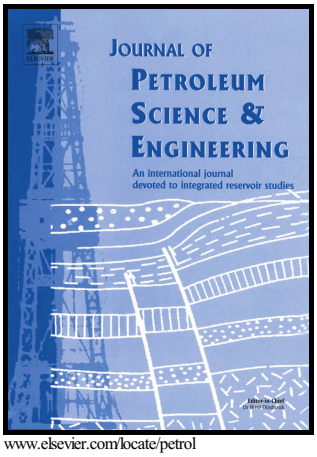

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Abstract

Fractured reservoirs are highly heterogeneous and can be characterized by the probability distributions of fracture properties in a discrete fracture network model. The relationship between production performance and the fracture parameters is vastly nonlinear, rendering the process of adjusting model parameters to match both the static geological and dynamic production data challenging. This creates a need for a comprehensive history matching workflow for fractured reservoirs, which considers different local as well as global fracture parameters and leads to multiple equally-probable realizations of the discrete fracture network model parameters for uncertainty quantification.

This paper presents an integrated approach for the history matching of fractured reservoirs. This new methodology includes generating multiple discrete fracture models, upscaling them for numerical multiphase flow simulation, and updating the fracture properties using dynamic flow responses such as continuous rate and pressure measurements. Available geological and tectonic information such as well-logs, seismic, and structural maps are incorporated into commercially available DFN modelling and simulation software to infer the probability distributions of relevant fracture parameters (including aperture, length, connectivity, and intensity) and to generate multiple discrete fracture network model realizations. The fracture models are further