# Modeling a Fractured Reservoir for a Brown Field by Integrating Geologic and Production Data

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## Abstract

Ras Gharib field, located in the Gulf of Suez, Egypt, is a structurally complex field with a large number of faults and complex stratigraphy. Ras Gharib field has been producing since 1930s. The field operator has realized the need for a reservoir model to predict reservoir performance so as to optimize the recovery of the remaining reserve. Previously only limited reservoir characterization was performed, and the reservoir models that were built were unable to match the field production data despite significant modifications of petrophysical properties of the models. The field development plans couldn't confidently rely on these models, as they didn't have an adequate history match to the production data.

The factors that negatively affected the previous models were first screened. For example, it was realized that the main producing unit of the reservoir is highly fractured, and the fact that no fracture property was modeled in the previous models significantly affected the mismatch to the production history data.
A new modeling workflow was developed to improve the fracture characterization of the reservoir with limited data. Faults were identified and faulting-induced fractures were inferred from the fault patterns in the field. The descriptive fault-patterns were further quantified and validated using the production data. Because no image logs were available, production logs were used as feedback to model the fracture properties. As drilling mud losses were recorded as a qualitative indicator, a quantitative methodology based on an enhanced geostatistical technique was developed to integrate them with the production data and faulting-induced fracture properties.

As a result of using a highly integrated modeling workflow that incorporates the fracture characterization and property modeling, the reservoir model has shown very good early history match to the field production data. This has helped determining the remaining reserves, and is to be used for the next phase development planning of the field.

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