Use of Mechanistic Model to Assess the Sweep Efficiency Along Horizontal Wells

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Abstract

 This paper aims to analyze the implications of carbonate cyclicity, with various degrees of heterogeneity, on the areal and vertical sweep efficiency of water-flood projects. The area where the model was built pertains to Thamama B reservoir in X-field. With the assistance of high resolution mechanistic static and dynamic models, the project also investigated the impact of various reservoir descriptions and multiple well completions, involving vertical and horizontal wells, on the overall sweep efficiency and recovery factor. Detailed geostatistical models of the petrophysical properties were built, capturing the small scale sedimentary and diagenetic cycles, including the dense stylolitic intervals. The mechanistic model, based on real field data, comprised of a crestal oil producer and a downflank water injector, with different completion strategies. The conclusion of this work showed that in order to achieve a higher recovery factor it is not enough to change the injection fluid or the displacement efficiency mechanism. The completion strategy is equally important.