

The use of the ensemble Kalman filter for production management in the presence of impermeable obstructions

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Abstract

This study presents a novel approach for maximizing the efficiency of the water flooding process by controlling the flood front dynamics. The optimization is carried out assuming the presence of spatially varying geological properties and impermeable obstructions located between the injection and production wells and thus hindering the sweep efficiency inside the reservoir. Controlling the flood front dynamics is achieved by coupling an ensemble Kalman filter scheme with a two-phase immiscible flow reservoir simulator and thus relying on a set of observational data provided via a grid of smart wells. For that purpose, a virtual grid of smart wells assumed to be fully saturated with water and evenly distributed around the +obstruction location is employed. The presented method is applied to a synthetic numerical example where the fluid front is tracked to maximize water flooding by controlling the injection and production rates.