

عنوان مقاله:

Water Flooding Performance Evaluation Using Percolation Theory

محل انتشار:

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خلاصه مقاله:

Water flooding is a well-known secondary mechanism for improving oil recovery. Conventional approach to evaluate the performance of a water flooding process (e.g. breakthrough and post breakthrough behavior) is to establish a reliable geological reservoir model, upscale it, and then perform flow simulations. To evaluate the uncertainty in the breakthrough time or post breakthrough behavior, this procedure has to be repeated for many realizations of the geological model, which takes many hours of CPU time. Moreover, during the early stage of reservoir life, when data is scarce, breakthrough and post breakthrough time behavior prediction are usually based on analogues or rules of thumb. Alternative statistical approach is to use percolation theory to predict breakthrough and post breakthrough behavior. The main contribution is to evaluate the applicability of the existing scaling laws of the breakthrough time by the numerical flow simulation results using the Burgan formation dataset of Norouz offshore oilfield in the south of Iran. Moreover, we extend the scaling to the post breakthrough behavior. There is good agreement between the predictions from the percolation based expressions and the numerical simulation results. Moreover, the prediction from the scaling law took a fraction of a second of CPU times (as it only needs some algebraic calculations) compared with many hours required for the conventional numerical simulations.

کلمات کلیدی:

Percolation, Breakthrough time, Post breakthrough behavior, Validation, Case study

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