

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Scaling Immiscible Displacements in Porous Media with Horizontal Wells RIDHA GHARBI, MESHAL ALGHARAIB, Kuwait University — The displacement of one fluid by another in a porous medium is the basis of many industrial processes such as Enhanced Oil Recovery (EOR) and the remediation of contaminated aquifers. In recent years, the petroleum industry has experienced a rapid increase in using horizontal wells in these displacement processes. In this study, a general method is presented to scale immiscible displacements of oil by water through homogeneous reservoirs produced by horizontal wells. Following a rigorous procedure of inspectional analysis, results show that there are five independent dimensionless scaling groups that describe immiscible displacement of oil by water in two-dimensional, homogeneous, anisotropic porous medium with constant porosity and dip angle. These represent the minimum number of dimensionless groups which are required to scale the displacement. Fine-mesh numerical simulations were then performed in order to reveal the functional relationships between the scaling groups describing the displacement and the fractional oil recovery obtained from such displacement. The results obtained from several well configurations will be presented. These relationships can be used as a quick prediction tool for the fractional oil recovery for any combinations of the scaling groups, thus eliminating the need for the expensive fine-mesh simulations. These results have potential applications in modeling immiscible displacements and in the scaling of laboratory displacements to field conditions.

Ridha Gharbi
Kuwait University

Date submitted: 15 Jun 2005

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