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The Performance of Fluid Displacements in Heterogeneous Reservoirs RIDHA GHARBI, MESHAL ALGHARAIB, ABDALLAH AL-AJMI, Kuwait University — The injection of one fluid to displace another in a heterogeneous porous medium is the basis of many industrial processes such as Enhanced Oil Recovery (EOR) and the remediation of contaminated aquifers. When the results are presented in scaled format, it is then possible to use the data acquired on a given system (i.e. laboratory system) to predict the behavior of another similar system, the one of actual interest, the prototype. The study followed a rigorous procedure of inspectional analysis to derive the independent dimensionless scaling groups that describe immiscible displacements in heterogeneous reservoirs with constant porosity and dip angle. 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, which includes the use of several horizontal-vertical well combinations. 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. In addition, they provide the condition under which a given well configuration may yield better recovery performance.

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