

UNSTEADY-STATE DISPLACEMENT COMBINED WITH CENTRIFUGE TECHNIQUE FOR MEASUREMENT OF RELATIVE PERMEABILITY

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Abstract A technique for measurement of water/oil relative permeability by using a combination of unsteady-state flooding and centrifuging is described. Both oilfloods on strongly water-wet and waterfloods on intermediate wet sandstone samples have been investigated.

The method consists of an unsteady-state flooding to obtain relative permeability of both phases and, thereafter, continuing the drainage process in a centrifuge. Compared to the flooding displacement, one will normally get a higher differential pressure across the core in a centrifuge and, thereby, achieve relative permeability values over an extended saturation range for the produced phase.

The results show for both wettability systems that the relative permeability values based on the centrifuge technique are in good agreement with those from the flooding tests, provided that the flooding displacement is correctly scaled. In the case of a strongly water-wet system an adequate scaling technique is to use the Rapoport & Leas scaling factor. However, this scaling factor is not appropriate for the intermediate wetted system. A scaling technique which simply focuses on the differential pressure across the core plug is proposed. Analysis of the results showed that by staying above a minimum value of the differential pressure, a good agreement between the flooding and the centrifuge technique was achieved.