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Effect of Fractional Flow Curves on the Heavy Oil and Light Oil Recoveries in Petroleum Reservoirs

Authors : Abdul Jamil Nazari, Shigeo Honma

Abstract : This paper evaluates and compares the effect of fractional flow curves on the heavy oil and light oil recoveries in a petroleum reservoir. Fingering of flowing water is one of the serious problems of the oil displacement by water and another problem is the estimation of the amount of recover oil from a petroleum reservoir. To address these problems, the fractional flow of heavy oil and light oil are investigated. The fractional flow approach treats the multi-phases flow rate as a total mixed fluid and then describes the individual phases as fractional of the total flow. Laboratory experiments are implemented for two different types of oils, heavy oil, and light oil, to experimentally obtain relative permeability and fractional flow curves. Application of the light oil fractional curve, which exhibits a regular S-shape, to the water flooding method showed that a large amount of mobile oil in the reservoir is displaced by water injection. In contrast, the fractional flow curve of heavy oil does not display an S-shape because of its high viscosity. Although the advance of the injected waterfront is faster than in light oil reservoirs, a significant amount of mobile oil remains behind the waterfront.

Keywords : fractional flow, relative permeability, oil recovery, water fingering
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