

THE USE OF FOOTBATHS IN CENTRIFUGE CAPILLARY PRESSURE CURVE MEASUREMENTS

Klaas J. Bil
Shell Research Rijswijk, The Netherlands

Abstract Fluid production data measured in a centrifuge experiment need to be converted according to some model in order to extract a capillary-pressure curve. A widely applied procedure is the method developed by Hassler and Brunner in the 1940's. Various alternative procedures have been proposed since. All conversion procedures require the assumption introduced by Hassler and Brunner that at the bottom face of the sample the capillary pressure is zero.

This paper reports on ultracentrifuge experiments performed with and without a footbath on the same six sandstone core samples. The effect of a footbath is physically to impose the Hassler and Brunner boundary condition. Before each run the samples were fully saturated with brine, while air was used as the displacing phase. Data were processed using the Hassler and Brunner procedure, which was modified in order to account for the effect of the non-uniform gravitational field in the sample both in direction and in magnitude.

In our experiments, the wetting phase saturations corresponding to a given capillary pressure were on average about 4% V_p lower when a footbath was used. The observed effect of a footbath is explained by considering the capillary bundle model, leading to the conclusion that the Hassler and Brunner boundary condition does not hold in the case that no footbath is used (as is the conventional procedure). Consequently, centrifuge capillary-pressure curves measured with a footbath are more representative of the true capillary behaviour.