

**LOCAL SATURATION MEASUREMENT WHILE CENTRIFUGING (MWC) FOR IMPROVING CENTRIFUGE CAPILLARY-PRESSURE CURVE DETERMINATION.**

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**ABSTRACT**

In this paper, an improvement of the centrifuge method is presented. It consists of continuous determination of the local saturation, at three locations along a core, while centrifuging.

Usually, the centrifuge method only leads to a measure of fluid production, (i.e. average saturation) in a core at different rotation velocities. Then, the data are used to compute capillary pressure curves. But this transformation requires physical assumptions and mathematical procedures, which can generate large errors.

Our approach consists in (i) recording transit times of ultrasonic waves through three parts along the core, during the rotation, and, (ii) deducing local saturation by a specific and simple calibration. For oil-brine drainage in Vosges sandstone samples, the correspondence between transit times and saturation has been checked against CT Scanner analysis and imaging.

Using this approach, direct determinations (i.e. without any mathematical treatment) of capillary pressure curves are presented. These curves are in agreement with those obtained by the standard centrifuge method and by mercury injection. They are more accurate (higher number of measurements,  $P_c$ ,  $S$ ) or can be obtained more rapidly (for the same number of measurements) .

The main assumptions for the centrifuge method are evaluated. It is found that their failure is possible more often than usually reported.

To conclude our method leads to reliable local saturation measurements which are very useful for capillary pressure curve determination and for physical investigation of the centrifuge method as well.