



Contribution ID: 396

Type: Oral Presentation

Extended Analysis of Relative Permeability Curves Using the JBN Method and X-Ray CT Scanning

Wednesday, 21 May 2025 14:05 (15 minutes)

The accurate determination of relative permeability is crucial for characterizing multiphase flow in porous media, with direct implications for reservoir simulation and enhanced oil recovery strategies. Traditional methods, such as the Johnson-Bossler-Naumann (JBN) unsteady-state approach, primarily focus on core outlet measurements. This study introduces an extended JBN method that enables the determination of relative permeability curves at specific sections of the core equipped with pressure taps. Additionally, the integration of X-Ray CT scanning provides spatially resolved saturation profiles, significantly enhancing the accuracy and detail of core flooding experiments.

Core flooding experiments were conducted on sandstone samples under controlled conditions of 20°C and 1450 PSI pore pressure. The samples exhibited approximately 21% porosity and 180 mD permeability. Injected water, with a total dissolved solids (TDS) concentration of 36,000 ppm and a CT attenuation value of 231 Hounsfield Units (HU), was doped with 24% NaI to enhance contrast with the oil and rock. EMCA mineral oil served as the non-wetting phase. CT scans were performed at intervals of 0.08 pore volumes (PV) up to the breakthrough point, transitioning to a logarithmic scale thereafter.

The extended JBN method produced relative permeability curves that closely matched those obtained using the standard approach, with differences primarily attributed to error propagation and measurement uncertainties. Additionally, the integration of CT scanning provided detailed saturation distribution profiles, enabling a more comprehensive understanding of fluid behavior within the core. These findings demonstrate the reliability of the extended JBN approach and emphasize the value of incorporating advanced imaging techniques to enhance the spatial precision and accuracy of relative permeability characterization in porous media.

Country

Brazil

Acceptance of the Terms & Conditions

[Click here to agree](#)

Student Awards

I would like to submit this presentation into the InterPore Journal Student Paper Award.

Water & Porous Media Focused Abstracts

This abstract is related to Water

References

Doi: 10.1002/2016WR019204; <https://doi.org/10.1007/s11242-019-01369-w>; <https://doi.org/10.1029/2019WR025156>;
<https://doi.org/10.1007/s11242-023-01988-4>

Primary author: HERRERA SARAIVIA, Jose Maria

Co-authors: Dr VIDAL VARGAS, Janeth Alina (University of Campinas); BARROS ZANONI LOPES MORENO, Rosangela (University of Campinas); FLORES ANTELO, Walter Leonardo (Unicamp)

Presenter: HERRERA SARAIVIA, Jose Maria

Session Classification: MS10

Track Classification: (MS10) Advances in imaging porous media: techniques, software and case studies