Contribution ID: **446** Type: **Oral Presentation**

Comparison of the Generalized Network Model to Direct Numerical Simulation for Two-Phase Flow

Thursday, 2 June 2022 14:15 (15 minutes)

A thorough understanding of pore-scale modelling techniques is essential to flow through permeable media research. We compare two phase-flow simulations from the generalized network model (GNM) [Raeini et al, 2017, 2018] with a recently developed lattice-Boltzmann model (LBM) [Akai et al, 2018, 2020] for drainage and waterflooding in two samples —a synthetic beadpack and a micro-CT imaged Bentheimer sandstone —under water-wet, mixed-wet and oil-wet conditions. Macroscopic capillary pressure analysis reveals good agreement between the two models, and experiments, at intermediate saturations but shows large discrepancy at the end-points. At a resolution typically used in research settings, the LBM is unable to capture the effect of layer flow which manifests as abnormally large initial water and residual oil saturations. Critically, pore-by-pore analysis shows that the absence of layer flow limits displacement to invasion-percolation in mixed-wet systems. The GNM is able to capture the effect of layers, and exhibits predictions closer to experimental observations in water and mixed-wet Bentheimer sandstones. Overall, we present a workflow for the comparison of pore-network models with direct numerical simulation of multi-phase flow. We demonstrate that the GNM is an attractive option for cost and time-effective predictions of two-phase flow, and show that care must be taken when selecting pore-scale models.

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References

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Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

In person

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