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Local wettability characterization of porous media under two-phase conditions using lattice-Boltzmann simulations

Thursday, 2 June 2022 15:15 (1h 10m)

Wettability is a controlling property for multi-phase processes, and therefore an important input to simulate multi-phase processes in porous media. Conventionally, wettability is assumed to be a constant property throughout the medium, despite the common knowledge that it is not uniform in natural porous media. Under two-phase conditions, every three-phase contact line conveys information about the local wettability. In this work we use μ -CT images of the distribution of two phases under no-flow boundary conditions to assess the wettability. We isolate the three-phase contact lines, and then conduct local lattice-Boltzmann (LB) simulations to replicate the relaxed fluid configurations in the pore-space. We take the affinity parameter of the LB color-gradient model as the tuning parameter, and optimize the fluid configuration compared to the observation from the μ -CT data to obtain local wetting descriptions. We later assimilate all the obtained information from different parts of the μ -CT image, and populate the final data into the whole sample. The obtained wettability map can be used to simulate displacement processes for the two given fluid phases in the imaged porous medium for digital rock physics analysis.

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References

Time Block Preference

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

Participation

In person

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