Contribution ID: **244** Type: **Poster (+) Presentation**

Analytical Model for Predicting Dynamic Capillary Pressure-Saturation Relationship in Porous Media

Wednesday, 2 June 2021 09:00 (1 hour)

The capillary pressure defined as the pressure difference between the non-wetting and wetting fluid is one of the important parameters that govern the multiphase flow through porous media. Traditionally, the capillary pressure-saturation relationship is determined under equilibrium conditions. However, it has been demonstrated in previous studies, that the dynamic conditions of the system (i.e the rate of flow) can significantly influence the capillary pressure-saturation behavior, and therefore the classical static assumption may not be valid under transient conditions. In this research, we developed an analytical model to study the dynamic nature of the capillary pressure-saturation profile. We extend the Analytical Pore Network Approach (APNA) introduced by Rabbani et al. (2019) to derive a mathematical model for the direct computation of dynamic capillary pressure-saturation relationship in porous media. According to our knowledge, this is a first attempt to analytically predict the dynamic capillary pressure-saturation profile; providing an opportunity for a rapid prediction multiphase flow properties under non-equilibrium conditions. The analytical model was benchmarked against experimental results reported in the literature under various boundary conditions, showing a satisfactory match between the experimental and analytical results.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

Rabbani, H. S., Seers, T. D., & Guerillot, D. (2019). Analytical Pore-Network Approach (APNA): A novel method for rapid prediction of capillary pressure-saturation relationship in porous media. Advances in Water Resources, 130, 147-156.

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