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Modeling and experiments for fractional-wet rhomboidal pores RAHUL VERMA, SRIRAM CHANDRASEKHAR, MASHA PRODANOVIC, KISHORE MOHANTY, University of Texas at Austin — Wettability is commonly expressed as the contact angle that fluid interfaces form with a solid surface in the presence of another fluid. For multiphase flow in porous media, pore-scale wetting behavior controls the movement of fluid-fluid interfaces and can significantly alter macro-scale properties like capillary pressure and relative permeability. Fractional wettability of soil (where grains are a mixture of hydrophilic and hydrophobic) is common, as is its counterpart in rocks called mixed wettability. Wettability behavior may be intrinsic, or brought about by extreme conditions such as wildfires or presence of non-aqueous contaminants. Modeling fractional-wet systems at the pore-scale should reveal insights into different phenomena like trapping of phases and hysteresis in capillary pressure-saturation curves. Validation of tools is important as modeling the moving contact line is not a trivial computational task, alas lack of analytical models makes it difficult. In this work, we conduct experiments to determine threshold capillary pressures for drainage in rhomboidal arrangements of fractional-wet spheres. We then use the level-set method based model of capillarity dominated displacement to model this system.

Rahul Verma
University of Texas at Austin

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