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Capillary Force Driven Spread of Wetting Liquid into Porous Medium B. MARKICEVIC, H. LI, A.R. ZAND, H.K. NAVAZ, Kettering University — Once deposited onto porous medium surface, a wetting liquid imbibes porous medium due to influence of the capillary pressure. While there is free liquid on the porous medium surface, the liquid primary spread into porous medium is driven by difference in the capillary pressures in the free liquid and the liquid in porous medium. Having the free liquid volume equal to zero, the spread continues as secondary spread due to the local porous medium heterogeneities that cause the gradients in the capillary pressure and liquid saturation. A *uni*-directional primary and secondary spreads in the rectangular domain are studied experimentally, where the saturation profiles along principal flow direction are experimentally measured for different times throughout the liquid spread. For medium grain sand/ ethylene glycol it was found that the wetted volume increases almost twice after the time equal to fourteen days. For the same *uni*-directional flow, the axial direction saturation profiles are also predicted numerically and compared with the experimental saturation profiles. The numerical solution is obtained using the capillary network model that utilizes the micro-force balance at the liquid free interface, and the network parameters are varied until matching the experimental and numerical saturation profiles. Finally, from the capillary network defined the capillary pressure and the relative permeability curves are determined.

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