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The types of boundary conditions in the secondary capillary flow and liquid distribution B. MARKICEVIC, H.K. NAVAZ, Kettering University — After depositing a wetting liquid onto a porous medium surface, and under the influence of the capillary pressure, the liquid is imbibed into porous medium creating a wetted imprint. The flow within the porous medium does not cease once all liquid is imbibed, but it continues as a secondary capillary flow, where the liquid flows from large pores into small pores along the liquid interface. The flow is solved using the capillary network model, and influence of the boundary condition on the liquid distribution within porous medium is investigated. The porous medium boundaries can be defined as open or closed boundaries, where an open boundary is treated as a part of the liquid interface. In contrast, the closed boundary is defined as a static entity, in which the potential condition for flow to take place is never satisfied. By defining the porous medium boundaries as open or closed, one is able to obtain a very different liquid distribution within the porous medium. The liquid saturation profiles along the principal flow direction ranging from constant, to steadily decreasing, to the profile with a local maximum, are found numerically. Finally, it is shown that these saturation profiles are also related to the geometrical dimension that is perpendicular to the pertinent boundary, and changing the boundary type from open to closed allows the liquid distribution within porous medium to be controlled.

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