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Effect of Pore Size and Pore Connectivity on Unidirectional Capillary Penetration Kinetics in 3-D Porous Media using Direct Numerical Simulation AN FU, University of Cincinnati, NIKHIL PALAKURTHI, University of Cincinnati / The Procter Gamble company, SANTOSH KONANGI, University of Cincinnati, KEN COMER, The Procter Gamble company, MILIND JOG, University of Cincinnati — The physics of capillary flow is used widely in multiple fields. Lucas-Washburn equation is developed by using a single pore-sized capillary tube with continuous pore connection. Although this equation has been extended to describe the penetration kinetics into porous medium, multiple studies have indicated L-W does not accurately predict flow patterns in real porous media. In this study, the penetration kinetics including the effect of pore size and pore connectivity will be closely examined since they are expected to be the key factors effecting the penetration process. The Liquid wicking process is studied from a converging and diverging capillary tube to the complex virtual 3-D porous structures with Direct Numerical Simulation (DNS) using the Volume-Of-Fluid (VOF) method within the OpenFOAM CFD Solver. Additionally Porous Medium properties such as Permeability (k), Tortuosity (τ) will be also analyzed.

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