Abstract Submitted
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Wicking flow through microfluidic channels HADI MEHRABIAN, PENG GAO, JAMES J. FENG, University of British Columbia — Diffuse-interface models can be used to simulate contact line motion on solid substrates by regularizing the singularity by diffusion. Using the Cahn-Hilliard model and a finite-element algorithm, we have computed wicking flows in microfluidic channels of three types of geometries. The first type features axisymmetric tubes with contractions and expansions of the cross section. Both drainage and imbibition dynamics are studied, and we define critical conditions for the contact line to negotiate sharp corners on the wall. The second type consists of bifurcations in micro-channels where the competition between capillary pressure in the branches and viscous loss in the feeding tube produces different flow patterns. Finally, we examine tortuous channels in Z and U-shaped turns, where the effect of streamline on the flow rate is analyzed as a prototype for tortuosity in porous medium.

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