Abstract Submitted
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Partial liquid-penetration inside a deep trench by film flowing over it[1] PHUC-KHANH NGUYEN, YIANNIS DIMAKOPOULOS, JOHN TSAMOPOULOS, Laboratory of Fluid Mechanics and Rheology, Dep. of Chemical Engineering, University of Patras — Liquid film flow along substrates featuring a deep trench may not wet the trench floor, but create a second gas-liquid interface inside the trench. The liquid penetration inside the trench depends on the location and shape of this inner interface. The penetration increases by decreasing the two three-phase contact lines between the inner interface and the two side-walls or the flow rate and depends on the liquid properties. This partial-penetration is studied by employing the Galerkin / finite element method to solve the two-dimensional steady-state Navier-Stokes equations in a physical domain that is adaptively remeshed. Multiple branches of steady solutions connected via turning points are revealed by pseudo arc-length continuation. Flow hysteresis may occur in a certain range of liquid penetration depth, when the interaction of the two interfaces changes qualitatively. This induces an abrupt jump of penetration distance and deformation amplitude of the outer interface.

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