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Slip-accelerated falling drop along a vertical fiber HSIEN-HUNG WEI, National Cheng Kung University, DAVID HALPERN, University of Alabama — Effects of wall slip on the motion of a falling drop along a vertical fiber are investigated theoretically. Using lubrication theory, we derive an interfacial evolution equation to describe how the drop's travelling speed and height vary with the Bond number and the slip length. Our numerical results reveal that the drop can travel much faster than the one without slip due to the dramatic increase in the travelling speed with the slip length. The drop height is also found to rapidly increase with the slip length, which is due to enchanced capillary draining from the film into the drop. For Bond number above some critical value, however, capillary draining is suppressed and hence so is the drop height. We determine how the critical Bond number varies with the slip length. For a sufficiently large Bond number, the relevant Kuramoto-Sivashinsky equation is also derived to reveal how the suppression of the capillary instability is mediated by slip effects in the weakly nonlinear regime.

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