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Viscous boundary layer in splashing drops MICHAEL CHEMAMA, Harvard University, RAVI SINGH, Brown University, MICHAEL BRENNER, Harvard University, SHREYAS MANDRE, Brown University — The discovery that ambient pressure could control the splash of a drop on a solid surface generated renewed efforts to understand the physical mechanisms at work. A recent theoretical analysis [Mandre and Brenner; JFM, 690, 148, (2012)] predicted an initial self-similar evolution governed by the drop's inertia and the viscous drainage of the thin layer of air below. This solution breaks down after surface tension or non-linear inertia terms become important. Viscous effects in the drop were computed and shown to be asymptotically negligible. Here we show that the viscous boundary layer approximation, on which this result relies, can become invalid as there is a crossover between the boundary layer thickness and the typical dynamical length of the self-similar evolution. Whether this happens before or after surface tension sets in can lead to different behaviors.

Michael Chemama
Harvard University

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