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Maximal expansion and retraction dynamics in drop-on-drop impacts MAHER DAMAK, KRIPA VARANASI, Massachusetts Inst of Tech-MIT — The phenomenon of a droplet impacting another droplet on a surface is ubiquitous in agricultural sprays, thermal sprays and rain impact on surfaces. Here we experimentally study drop-on-drop impacts on superhydrophobic surfaces and characterize the maximum expansion diameter and retraction time. We extend previous arguments for single drop impacts to model the droplet diameter and thickness at its maximal expansion in the capillary and viscous regimes. We show that our generalized model captures drop-on-drop impacts over a large range of viscosities, impact velocities, droplet sizes and size ratios, and that previous single drop impact models are a particular case of our model. We then investigate the retraction dynamics and show that the retraction phase has no memory of the initial impact dynamics and that single drop retraction times can be used with a new effective length scale, in both the inertial and viscous regimes. Our results expand previous models of droplet impacts and suggest that many results from the single drop impact literature may be extended to multiple drop impacts.

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