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Viscous Effect of Drop Impacting on Liquid Film[1] XIAOYU TANG, ABHISHEK SAHA, CHUNG K. LAW, Princeton University, CHAO SUN, University of Twente — Drop impacting a liquid film is commonly observed in many processes including inkjet printing and thermal sprays. The accumulation and growth of the film depend on the outcome of subsequent drop impact on the initially formed film. In our recent study (Tang, et al. Soft Matter 2016), we have proposed a regime diagram based on the Weber number *We* (ratio of impact inertia and surface tension) and the film thickness, characterizing non-monotonic transitions between the bouncing and merging outcomes and providing scaling analysis for the boundaries for a single liquid (n-tetradecane). Since liquid viscosity fundamentally affects the impact outcome, through its influence on the flow field and dissipation of the kinetic energy, here we extend the study for a number of alkanes and silicone oils, covering a wide range of viscosity, to evaluate its effect on the regime diagram. We will show that while the regime diagram maintains its general structure, the merging regime becomes smaller for more viscous liquids and eventually the non-monotonicity disappears. We will model the viscous effects and present a modified scaling. This new scaling attempts to unify all liquids and provides a useful tool to manipulate the outcome of drop impact on liquid film.

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