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Simulations of high and low viscosity micro-scale droplets splashing on a dry surface ARNOUT BOELENS, ANDRZEJ LATKA, JUAN DE PABLO, University of Chicago — When a droplet hits a dry surface at atmospheric pressure with a high enough impact velocity, it splashes and breaks apart into many smaller droplet. However, when the ambient gas pressure is reduced, splashing is suppressed. This is contrary to intuition, which suggest a more violent splash should occur at lower gas densities due to reduced drag forces. Although splashes of high and low viscosity liquids visually look very different, they also obey the pressure effect. In this study the effect of viscosity on splashing is investigated, to get a better understanding of the pressure effect in general. Simulation results are presented comparing splashing of low viscosity ethanol with high viscosity silicone oil in air. The droplets are several hundred microns large. The simulations are 2D, and are performed using a Volume Of Fluid approach. The contact line is described using the Generalized Navier Boundary Condition. Both the gas phase and the liquid phase are assumed to be incompressible. The results of the simulations show good agreement with experiments, including reproduction of the pressure effect, and suggest that the same scaling laws that apply to lamella formation in simple drop deposition, also apply to splashing droplets.

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