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Simulation of splashing of micro-scale droplets on a dry surface ARNOUT BOELENS, ANDRZEJ LATKA, CACEY STEVENS, JUAN DE PABLO, University of Chicago — Results are presented for the simulation of micro-scale droplets splashing on a dry surface. The simulations are performed using a Volume Of Fluid approach and a Finite Volume technique. The contact line is described using a Generalized Navier Boundary Condition with a dynamic microscopic contact angle. Both the gas phase and the liquid phase are assumed to be incompressible. The results of these simulations show good agreement with experiments. Independent of the wetting properties of the surface, simulations reveal the formation of a liquid sheet with an apparent contact angle approaching 180 degrees. This liquid sheet breaks up into smaller droplets as the spreading progresses. When the pressure of the system is reduced, the droplet does not break up and splashing is suppressed. Depending on the velocity with which the contact line moves, different flow regimes are observed. One of these regimes involves air bubbles becoming entrained in the liquid phase, similar to what is observed during wetting failure in coating processes. Mesh resolution is critical to describe contact line behavior, liquid sheet formation, and to reproduce the effect of pressure. In this work, the resolution is of the order of 10 nm, and the droplets are several hundred microns large.

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