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Coalescence dynamics of two unequal size water droplets in air
NITIN GOYAL, ATUL SHARMA, Indian Institute of Technology Bombay — Coalescence dynamics of two water droplets falling under gravity in air, is studied for various diameter ratio (d_{bottom}/d_{top}) D_r =0.15-6 and Ohnesorge number Oh=0.001-0.025 at a Bond number Bo=0.092. Axisymmetric simulations are done using sharp interface level set method based in-house code. We presented a regime map for the various Oh and D_r, with partial coalescence at smaller as well as larger values of D_r and full coalescence at intermediate value of D_r. For a transition in the coalescence dynamics, the present work reports a smaller and a larger critical value of D_r as compared to one critical D_r (the larger one) reported in the literature. Over the range of Oh studied here, there is a monotonic increase in both the critical D_r with increasing Oh – from 1.5 to 5.7 for the larger critical D_r and from 0.3 to 0.4 for the smaller critical D_r. The pinch-off height of satellite droplet is larger for partial coalescence at the larger D_r as compared to that at the smaller D_r. The partial coalescence regime at the smaller D_r is presented here for the first time.

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