Abstract Submitted
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Unsteady fragmentation upon drop impact: Sheet dynamics Y. WANG, L. BOUROUIBA, MIT — Prior work, Wang & Bourouiba 2018b, showed that upon drop impact on a finite surface, continuous secondary droplet shedding occurs, and that both size and speed distributions of the droplets ejected are governed by the unsteadiness of the sheet expansion. In turn, this continuous shedding influences the sheet expansion. Incorporating continuous droplet shedding, we show how the sheet is governed by a non-Galilean expansion law from which we predict the time evolution of all key physical quantities from the sheet radius to the fluid shed by the rim, all in agreement with experimental measurements. We also discuss a peculiar property of the governing equation which imposes a time-to-maximum-radius independent of the impact energy. This property results in a temporal evolution of the partition of mass, momentum, and energy in the sub-parts of the fragmentating system that is independent of the impact conditions. We discuss the robustness of the results to changes of fluid properties.

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