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Unsteady fragmentation upon drop impact: prediction of droplet size and speed distributions L. BOUROUIBA, Y. WANG, MIT — Upon impact on a finite surface, a drop first expands into a sheet in the air, surrounded by a rim that destabilizes into ligaments that, in turn, shed secondary droplets. Wang & Bourouiba 2018b and Wang et al. 2018 showed that both size and speed distributions of the secondary droplets ejected during fragmentation are shaped by the unsteadiness of the sheet and rim. In this combined experimental and theoretical study, we derive and validate the analytic expression governing both size and speed distributions of secondary droplets ejected during such unsteady fragmentation, including time-evolution of the mean quantities associated with the distributions. We discuss the implications for various applications including contamination dispersal.

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