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**Contraction of Asymmetric Newtonian Liquid Filaments**

PATRICK MCGOUGH, KRISHNARAJ SAMBATH, SANTOSH APPATHURAI, PRADEEP BHAT, MICHAEL HARRIS, OSMAN BASARAN, Purdue University — Understanding the dynamics of satellite drops is important in several industrial applications involving drop formation including inkjet printing, electrospraying and atomization. The precursor to these satellite drops is a slender liquid filament that connects an about-to-form drop to the rest of the liquid in the nozzle. Once a filament is formed, it either contracts into a single satellite or breaks into multiple satellites, due to surface tension. Our understanding of the contraction of Newtonian filaments in a passive ambient fluid has improved greatly over the past two decades thanks to the numerical analyses of Schulkes (1996) and Notz and Basaran (2004) who modeled the filaments as cylinders that are terminated by two identical spherical caps. However, in many situations, the filament shapes at the onset of formation may not be symmetric as in the aforementioned studies. To improve our understanding of the fluid mechanics of contraction of such asymmetric filaments, we study here the recoil of filaments whose initial shapes are sections of tapered axisymmetric cones that are terminated by two unequal spherical caps. The dynamics are studied by both a 2-D analysis and a 1-D slender-jet analysis, and the results are summarized by constructing phase diagrams involving the dimensionless groups governing the dynamics.

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