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Effect of initial shape on contraction dynamics of Newtonian filaments KRISHNARAJ SAMBATH, PATRICK MCGOUGH, SANTOSH APPATHURAI, PRADEEP BHAT, MICHAEL HARRIS, OSMAN BASARAN, Purdue University — Slender liquid filaments arise in a number of applications involving drop formation, atomization, and cloud physics. Under the action of surface tension, a filament either contracts into a single drop or breaks into multiple drops as it recoils. 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 hemispherical caps. However, in many situations, the initial shape of a filament may resemble more that of two unequal globular or spherical drops that are connected by a slender cylinder. The dynamics of contraction of such filaments are studied here by both a two-dimensional analysis and a one-dimensional slender-jet analysis, and the results are summarized by constructing phase diagrams involving the dimensionless groups governing the dynamics.

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