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The Effect of Viscosity Ratio on Inertial Capillary Flow in Long Viscous Filaments. ADITYA N. SANGLI, DAVID I. BIGIO, AMIR RIAZ, University of Maryland, College Park — The effect of viscosity ratio between a long, stationery filament of fluid and a surrounding fluid has been previously studied experimentally and numerically in low Reynolds number flows; we study the influence of inertia for the same problem. Using direct numerical simulation of the two-phase flow and tracking the interface using a level-set function, we study the behavior of the filament in the presence of a dynamically active fluid surrounding it. A long filament of viscous liquid, when surrounded by a dynamically inactive fluid, retracts into a spherical drop by virtue of capillary flow in the absence of inertia. With the inclusion of inertial effects in the capillary flow, the filament shows different modes of behavior - like end pinching, or Rayleigh-Plateau instability, or retraction back into a spherical drop - as a function of initial aspect ratio of the filament and Ohnesorge number. We compare the filament behavior, in the presence of a dynamically active surrounding fluid, with the behavior of an isolated filament.

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