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Scaling in two-fluid pinch-off CHRIS POMMER, RONALD SURYO, HARIPRASAD SUBRAMANI, MICHAEL HARRIS, OSMAN BASARAN, Purdue University, West Lafayette, IN 47909 — Two-fluid pinch-off is encountered when drops or bubbles of one fluid are ejected from a nozzle into another fluid or when a compound jet breaks. While the breakup of a drop in a passive environment and that of a passive bubble in a liquid are well understood, the physics of pinch-off when both the inner and outer fluids are dynamically active is inadequately understood. In this talk, the breakup of a compound jet whose core and shell are both incompressible Newtonian fluids is analyzed computationally by a method of lines ALE algorithm which uses finite elements with elliptic mesh generation for spatial discretization and adaptive finite differences for time integration. Pinch-off dynamics are investigated well beyond the limit of experiments set by the wavelength of visible light and that of various algorithms used in the literature. Simulations show that the minimum neck radius r initially scales with time τ before breakup as τ^{α} where α varies over a certain range. However, depending on the values of the governing dimensionless groups, this initial scaling regime may be transitory and, closer to pinch-off, the dynamics may transition to a final asymptotic regime for which $r \sim \tau^{\beta}$, where $\beta \neq \alpha$.

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