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On the evolution of the drop-filament corner region during the pinch-off of viscoelastic fluids SANTOSH APPATHURAI, PRADEEP BHAT, MICHAEL HARRIS, Purdue University, West Lafayette, IN 47907, MATTEO PASQUALI, Rice University, Houston, TX 77005, OSMAN BASARAN, Purdue University, West Lafayette, IN 47907 — Fluid pinch-off is important in applications involving the production of drops, e.g., ink-jet printing and atomization, and in the capillary breakup extensional rheometry (CaBER). A characteristic feature of fluid pinch-off is the formation of drops that are connected to thinning threads. In the pinch-off of viscoelastic fluids, the region that connects the drops to the threads develops into a sharp corner. Recently, Clasen *et al.* [J. Fluid Mech. **556**, 283 (2006)] showed that such a corner evolves self-similarly—a result which can be exploited in estimating accurately the extensional viscosity of fluids from CaBER experiments. However, the agreement between the similarity solution derived by Clasen *et al.* and experiments is only qualitative, and it may be due to their approximation of the dynamics in the corner region by a one-dimensional analysis. The evolution of the drop-filament corner region is elucidated here using theory and both one- and two-dimensional computations. A new similarity solution is obtained which describes better the shape of the liquid-gas interface in the corner region, and the dynamics in the corner region is demonstrated to be two-dimensional.

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