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Evolution, Pinch-off, and Classification of the Steady-State Solutions of an Axisymmetric Drop in Stokes Flow SHADI NADERI, MONIKA NITSCHE, University of New Mexico — The evolution of an Axisymmetric viscous drop immersed in a strain field is examined numerically using higher order boundary integral simulation followed the work of Nitsche et al. [J. Comp. 229, 2010]. The effect of three parameters is examined, namely: the capillary number, the viscosity ratio and the relative nonlinearity in background flow. A classification of the steady-state solutions in parameter space for sufficiently small capillary number is presented including the regimes of oval, canonical and bell-shaped steady-states. The non-steady evolution for larger capillary number is also studied and classified. New results include the effect of the nonlinearity in background flow. The presence of a positive nonlinear term leads to corner formation as time goes to infinity. Negative nonlinearity on the other hand leads to a finite time singularity. Either the drop pinches at two points on the axis in finite time or the curvature blows up at a point away from the axis. Pinch-off is also investigated in detail.

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