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Capillary pinch-off of inviscid fluids at varying density ratios: the bubble limit DAVID LEPPINEN, University of Birmingham, JOHN LISTER, Centre for Mathematical Sciences, University of Cambridge, Wilberforce Road, Cambridge CB3 OWA, Unitied Kingdom, JENS EGGERS, Schools of Mathematics, University of Bristol, University Walk, Bristol, BS8 1TW, United Kingdom — The axisymmetric pinch-off of an inviscid blob of fluid of density ρ_1 in an ambient fluid of density ρ_2 is examined in the limit as the density ratio $D = \rho_1/\rho_2 \to 0$ using a boundary integral formulation. It has previously been shown (Leppinen & Lister, *Phys. Fluids*, **15(2)**, 568-578, 2003) that pinch-off is a self-similar process in the droplet limit as $D \to$ with the radial and the axial length scales decreasing as $\tau^{2/3}$ where τ is the time to pinch-off. In the droplet limit, the similarity form is independent of the initial conditions. In the bubble limit, as $D \to 0$, it is seen that pinch-off is also a self-similar process, however, in this case the similarity form is dependent on initial conditions. In the bubble limit the radial length scale decreases as τ^{c_1} and the axial length scale descreases as τ^{c_2} with both c_1 and c_2 (and the associated prefactors) depending on the value of the density ratio D and on the initial conditions. In the limit of $D = 0$, $c_1 \approx 0.55 \pm 0.01$ and $c_2 \approx 0.48 \pm 0.05$ dependent on initial conditions.

David Leppinen
University of Birmingham

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