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Theory of bubble tips in strong viscous flows JENS EGGERS, University of Bristol, Mathematics — A drop or bubble, placed in a strong viscous flow (such that viscous forces overwhelm surface tension), develops ends with very sharp tips. Here we show that the shape of the ends, non-dimensionalized by the tip curvature, is governed by a universal similarity solution, which we describe theoretically. The shape of the similarity solution is close to a cone, but whose slope varies with the square root of the logarithmic distance from the tip. With this insight, we are able to show that the curvature grows exponentially with the square of the flow strength. We show that for the case of a drop in a hyperbolic flow the similarity solution matches previous slender-body analyses, thus providing a complete description of the drop shape. Our theoretical results agree well with numerical simulations of the Stokes equation.

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