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Coalescence of Two Drops Surrounded by an Outer Fluid JOSEPH PAULSEN, RÉMI CARMIGNIANI, ANERUDH KANNAN, JUSTIN BURTON, SIDNEY NAGEL, University of Chicago — When two liquid drops make contact, a liquid bridge forms and then rapidly expands due to surface-tension forces that are divergent at the point where the drops first touch. This nonlinear process has received a lot of recent attention, especially for two liquid drops coalescing in vacuum or air. However, little is known about how the surrounding fluid influences the singularity when the two drops are surrounded by an external fluid with significant density or dynamic viscosity. We use a combination of high-speed imaging and an ultrafast electrical method to study coalescence in this regime. We find that even if the outer fluid is over 10 times more viscous than the fluid within the drops, the coalescence speed need not be affected, even near the singularity. In order to understand the nature of the flows in the surrounding fluid, we also study the limiting case of air bubbles coalescing inside a very viscous external liquid.

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