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Coalescence and Pinch-Off in Viscous Liquids[1] JOSEPH PAULSEN, University of Chicago, JUSTIN BURTON, Fred Hutchinson Cancer Research Center, SIDNEY NAGEL, University of Chicago — When two fluid drops come into contact, a topological transformation occurs as they rapidly coalesce into a single drop. Because of its speed and geometry, this finite time singularity is difficult to study optically. We therefore use an electrical method to probe viscous coalescence as early as 10 ns after contact. This technique was developed by Burton *et al.*[1] to study mercury drop pinch-off and adapted for salt-water coalescence by Case *et al.*,[2] revealing a breakdown of the expected universal dynamics in early-time inviscid coalescence. For viscous coalescence, we measure a resistance that decreases as t^{-1} at early times and as $t^{-1/2}$ at late times, with a crossover time that increases with viscosity. In the inviscid case, these power laws had been interpreted with a model in which the drops coalesce at a slightly deformed interface.[2] We explore this possibility as well as others, such as an anomalously long viscous regime. This electrical technique is also used to study viscous fluid pinch-off, which we compare with previous optical studies. [1] J. C. Burton, J. E. Rutledge, and P. Taborek, Phys. Rev. Lett. **92**, 244505 (2004). [2] S. C. Case and S. R. Nagel, Phys. Rev. Lett. **100**, 084503 (2008).

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