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Self-Similar Coalescence of Liquid Lenses[1] MICHIEL HACK, WALTER TEWES, KIRSTEN HARTH, University of Twente, QINGGUANG XIE, JENS HARTING, Eindhoven University of Technology, JACCO SNOEIJER, University of Twente — Thecoalescence of droplets is of key interest to many industrial applications, such as inkjet printing and spray formation. Here, we study the initial stages ofcoalescence of liquid lenses, consisting of droplets floating on a liquid pool. Using high-speed imaging, we find that the bridge grows with self-similar dynamics, with different scaling laws at low and high lens viscosities, indicating the existence of two coalescence regimes.We provide an analytical description based on the slender geometry of the system, using the two-dimensional thin sheet equations. Excellent agreement is found with the experiments, capturing both the exponents and the detailed spatial structure of the similarity solution in both regimes. Finally, we show that all data collapse on a single curve capturing the full range of the coalescence dynamics.

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