Abstract Submitted
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2D Rayleigh-Taylor instability: Interfacial arc-length vs. deformation amplitude[1] MARIE-CHARLOTTE RENOULT, University of Le Havre, PIERRE CARLES, Universite Pierre et Marie Curie, SAMEH FERJANI, CHARLES ROSENBLATT, Case Western Reserve Univ — Fluid interface instabilities are usually studied through the time evolution of the amplitude of deformation of the interface. While this approach is convenient, it often fails to fully describe the evolution of a deforming interface, especially when the interface cannot be represented as a single-valued function of a space coordinate. Here, we present experimental data on the Rayleigh-Taylor 2D instability for immiscible fluids having a single-mode sinusoidal initial perturbation, which is obtained through the use of magnetic levitation. We observe that new information can be retrieved by using an alternate metric to the amplitude, viz., the total arc-length of the interface (in 2D), or equivalently its total surface area (in 3D). In particular, we identify a master curve for the evolution of the arc-length over time, following three different regimes and on which all our data points fall. We conjecture that the exploration of such alternate metrics will yield interesting results on a broad range of interface instabilities.

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Charles Rosenblatt
Case Western Reserve Univ

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