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Time evolution of transients in a thin liquid film[1] JENNIFER RIESER, ROMAN GRIGORIEV, MICHAEL SCHATZ, Center for Nonlinear Science and School of Physics, Georgia Institute of Technology — We present experimental and theoretical results on transient behavior in the driven spreading of a thin liquid film on a solid substrate. Both gravitationally-driven and surface-tension-driven films are considered. Perturbations with well-defined spatial and temporal characteristics are applied via distributed optical heating of the film prior to instability onset; the corresponding perturbation-induced variations in film thickness are characterized by interferometry and fluorescence imaging. The subsequent evolution of rivulets arising from contact line instability is measured using image time series. Comparison of the initial disturbance to the final disturbance enables quantitative measurement of transient amplification rates; these rates are compared to the predictions of generalized stability theory that accounts both for the initial conditions of the experiments (i.e., the specific structure of the imposed perturbations) and for the non-normal character of the linear operator that governs the evolution of small disturbances.

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