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Universal Regimes in the Relaxation of Stepped Liquid Interfaces near Contact Lines OLIVER BAEUMCHEN, Max Planck Institute for Dynamics & Self-Organization (MPIDS), 37077 Goettingen, Germany, THOMAS SALEZ, MICHAEL BENZAQUEN, ELIE RAPHAEL, Laboratoire de Physico-Chimie Theorique, UMR CNRS 7083 Gulliver, ESPCI ParisTech, PSL Research University, Paris, France, MARCO RIVETTI, Max Planck Institute for Dynamics & Self-Organization (MPIDS), 37077 Goettingen, Germany — A liquid droplet on a perfectly smooth surface wets or dewets the substrate according to the difference between initial and equilibrium contact angles. Such a scenario, however, becomes much less intuitive whenever the initial shape of the interface is non-spherical. Indeed, the capillary-driven relaxation of the liquid surface may be in competition with the relaxation of the contact angle at the three-phase contact line. Here, we study the dynamics of stepped interfaces of thin polystyrene films on hydrophilic substrates. Annealing the polymeric film above its glass transition temperature induces flow which is precisely monitored using ex- and in-situ atomic force microscopy. Both pinned and receding contact line regimes are observed, corresponding to capillary levelling and dewetting of the liquid film. Rescaling with regard to the viscosity, surface tension and film thickness collapses the data on a master curve, providing a universal time for the transition between both regimes. In addition, we prove that the pinned interface exhibits self-similar height profiles which are captured by a thin film model in lubrication approximation.

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