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Spreading, superspreading and autophobing in surfactant-driven films OMAR MATAR, RICHARD CRASTER, Imperial College London — We study the dynamics of a surfactant-laden film resting on a solid substrate. We use lubrication theory to derive a coupled system of equations for the film thickness and surfactant concentrations; here, the surfactant is allowed to exist in the form of both monomers and micelles which can adsorb at the air-liquid and solid-liquid interfaces. These equations account for capillarity, Marangoni stresses, surface and bulk diffusion and sorption kinetics. Long- and short-range intermolecular forces are also considered and are assumed to depend on surfactant concentration. We examine the behaviour of the system by means of numerical simulations and show that a variety of different responses are possible depending on system parameters. These include, spreading, autophobing followed by dewetting (starting from a perfectly wetting situation) and superspreading (starting from a partially wetting situation).

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