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The role of surface elasticity in liquid film formation[1] LORENE CHAMPOUGNY, Univ of Paris - Sud 11 CNRS, BENOIT SCHEID, Univ. Libre de Bruxelles, FREDERIC RESTAGNO, EMMANUELLE RIO, Univ of Paris - Sud 11 CNRS, LABORATOIRE DE PHYSIQUE DES SOLIDES TEAM, TIPS - FLUID PHYSICS UNIT TEAM — The formation of thin liquid films, either free standing (soap films) or deposited on a solid substrate (coated films), is of utmost importance for many applications, ranging from the control of foam stability to surface functionalization. In this work, the behavior of thin liquid films during their generation from a surfactant solution is investigated through comparison between a hydrodynamic model including surface elasticity and experiments. "Twin" models are proposed to describe the coating of films onto a solid plate (Landau-Levich-Derjaguin configuration) as well as soap film pulling (Frankel configuration) in a single framework. Experimental data are successfully fitted using the models, surface elasticity being the only adjustable parameter. For a given surfactant solution, the analyses of soap and coated films both yield the same value for the effective surface elasticity, showing that it is an intrinsic parameter of a surfactant solution. Conversely, we demonstrate that Frankel- or Landau-Levich-like experiments can be used in practice as surface rheometers to determine the numerical value of the (effective) surface elasticity of a solution, especially for values lower than those measurable by classical devices.

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