

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Rupture of vertical soap films EMMANUELLE RIO, Laboratoire de Physique des Solides, Université Paris Sud, CNRS, Orsay — Soap films are ephemeral and fragile objects. They tend to thin under gravity, which gives rise to the fascinating variations of colors at their interfaces but leads systematically to rupture. Even a child can create, manipulate and admire soap films and bubbles. Nevertheless, the reason why it suddenly bursts remains a mystery although the soap chosen to stabilize the film as well as the humidity of the air seem very important. One difficulty to study the rupture of vertical soap films is to control the initial solution. To avoid this problem we choose to study the rupture during the generation of the film at a controlled velocity. We have built an experiment, in which we measure the maximum length of the film together with its lifetime. The generation of the film is due to the presence of a gradient of surface concentration of surfactants at the liquid/air interface. This leads to a Marangoni force directed toward the top of the film. The film is expected to burst only when its weight is not balanced anymore by this force. We will show that this leads to the surprising result that the thicker films have shorter lifetimes than the thinner ones. It is thus the ability of the interface to sustain a surface concentration gradient of surfactants which controls its stability.

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Date submitted: 29 Jul 2014

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