

A new setup for giant soap films characterization

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ABSTRACT

A popular question about bubbles and foams is: how can we obtain a nice, giant and stable bubble? What is the recipe and which set up could be used? This can be translated in scientific questions: what is the characteristic breakup time of a liquid film and how can it be related to the physical chemistry of the soap solutions and to the physical parameters (velocity, film width, fishing line used to create the film...) [1]? The answer is related, among others, to the gravity driven flow of the soapy liquid in the film. Here, our goal is to present in details a set up to generate and characterize giant soap film, 2 m * 0.8 m, and studying the thinning along time. Our set up is composed of frame of 2.2 m high, 1 m long and 0.4 m large. At the top, 2 coupled motors, combined to pulleys, entrain two bands at a constant and controlled velocity. As initiator, a fishing wire is fixed perpendicularly to the bands. The film is created when the fishing line is withdrawn out of the bubbling solution. Photo detectors placed near the film collect the light reflected by the film and inform about the film rupture. The humidity is controlled in the frame. In the main time, a UV-VIS-spectrometer allows to measure the film thickness. With a Labview interface, we control the speed so that it is possible to create some giant films at velocities going from some cm/s to 2.5 m/s and to measure continuously the thickness and the lifetime of the films. We demonstrate that a generation in controlled condition together with the characterization of the film thickness and stability is feasible with our setup.

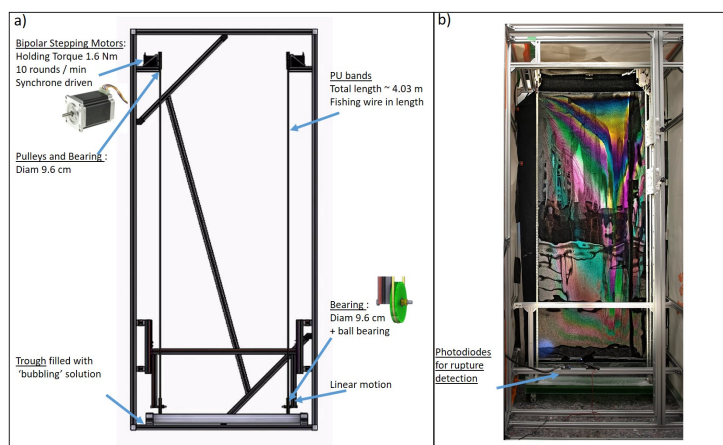


Figure 1: a): SolidWorks drawing of the set up; b): Photo of the set up with a 2 meters high

[1] L. Saulnier, L. Champougny, G. Bastien, F. Restagno, D. Langevin, and E. Rio. Soft Matter. 2014