Dancing rivulets in a Hele–Shaw cell

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We study a wetting rivulet acoustically excited when falling in a Hele–Shaw cell. At leading order, it behaves like a 1-dimensional membrane and follows the motion imposed by the speaker. Under certain conditions on the frequency and the strength of the excitation, the sinuosity of the rivulet pattern and the inhomogeneities in width become non-linearly coupled and amplify one another. This instability mechanism gives birth to the sinuous-variquous pattern one can see fig. 1.

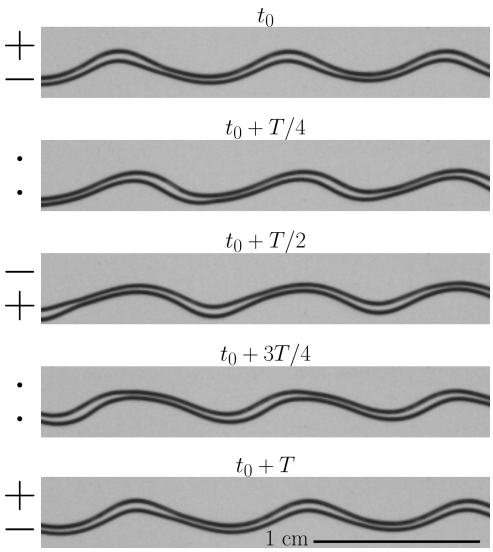

Figure 1. Modification of the rivulet geometry in response to an acoustic perturbation of period $T = 40$ ms (the $+/-$ signs indicate the sign of the differential pressure).

This instability is particularly surprising because it presents variquous oscillations which are normally damped in this set-up, and a sinuous pattern even in the flow rate range where only a straight rivulet is stable.

Références

1. A. Boudaoud, Y. Couder & M. Ben Amar, Self Adaptation in Vibrating Soap Films, *Phys. Rev. Lett.*, **82**, 19, (1999).