



ESPCI
Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05



Séminaire PMMH

Bureau d'Études, Bâtiment L, 2^{ème} étage

Vendredi 9 janvier 2015, 11h00-12h00

Émilie Dressaire

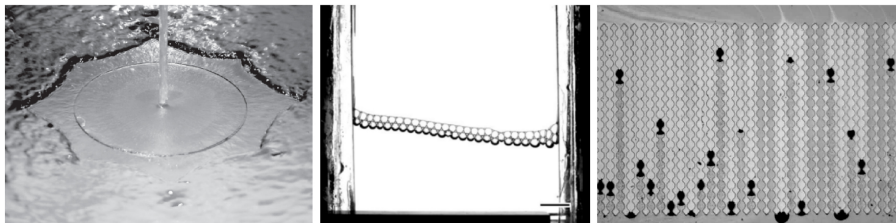
NYU School of Engineering

Tuning macroscopic flows using micro-structures

In this talk, I will present experiments devoted to systems in which the presence of micrometer-scale structures has macroscopic, observable effects on the flow.

We will first consider thin liquid films formed when jets impinge on solid surfaces such as hydraulic jumps and water bells. On a smooth surface, the flow is radial and isotropic. The addition of a controlled micro-patterned surface allows tuning of the geometry of the flow into polygonal water structures. We will then discuss the sloshing dynamics, i.e. the formation of waves on the surface of a liquid, due to the sudden motion of a partially filled container. We studied the influence of the addition of foam on top of the liquid and show that foam can be used to damp the waves, through viscous dissipation in the micrometer-scale Plateau borders.

We will then focus on particle-laden flows in microchannels. Microchannels are used as a pore-scale model of porous membranes or filters that allow fluid to pass through but trap contaminants. Once a clog is formed in a pore, incoming particles aggregate upstream, which leads to a dramatic reduction of the flow rate. We use this microfluidic approach to study the clog formation and the growth of the aggregate.



From left to right : a polygonal hydraulic jump, two layers of bubbles on a sloshing liquid and clogs in parallel micro-channels.