

# PHYSICAL MATHEMATICS SEMINAR

## ELASTICITY AND CAPILLARITY: WET HAIRS AND ORIGAMI

**JOSÉ BICO**

Ecole Supérieure de Physique et de Chimie Industrielles  
(ESPCI), FRANCE

### ABSTRACT:

Capillary forces are responsible for a large range of everyday observations: the shape of rain droplets, the imbibition of a sponge, the clumping of wet hair into bundles. Although they are often negligible on macroscopic structures, surface capillary forces may overcome volume forces at small scales and deform compliant micro-structures. Capillary-induced sticking can indeed prevent the actuation of mobile elements in micro-electro-mechanical systems (MEMS), or even cause their collapse. Capillary forces also have important consequences in biology such as the buckling of the airway lumen induced by surface tension, which can eventually cause the lethal closure of lung airways. I will present a few experimental situations where capillary forces are able to deform two types of objects: rods, and thin sheets. How many hairs are present in a bundle of wet fur? Can a thin sheet spontaneously wrap around droplet? I will try to describe how these different experiments are connected to the same length scale.



**TUESDAY, APRIL 1, 2008**

**2:30 PM**

**Building 4, Room 370**

*Refreshments at 3:30 PM in Building 2, Room 349  
(Applied Math Common Room)*



Massachusetts Institute of Technology  
Department of Mathematics  
Cambridge, MA 02139