THE CRM APPLIED MATHEMATICAL PHYSICS (CAMP) SEMINARS

CENTRE DE RECERCA MATEMÀTICA

Rodrigo Ledesma-Aguilar

Northumbria University

Moving a droplet almost for free.

Abstract:

Moving or deforming a liquid droplet in contact with a solid surface often involves an energy change. This is because a change in configuration is normally linked to a displacement in the local capillary energy landscape. The displacement can be static or dynamic, and will often be opposed by dissipative forces, such as contact angle hysteresis or viscous friction.

In this talk we explain recent theoretical and experimental results that go beyond this conception and explore the concept energy invariance in capillary systems. By identifying the underlying symmetries of the equilibrium configuration of a liquid droplet in contact with solid boundaries, we construct energy-invariant paths upon a reconfiguration of the solid boundaries. Such paths can lead to deformations and translations of the droplet whilst keeping a net zero change in the free energy of the system. Therefore, any energy losses upon actuation stem from out of equilibrium processes. Experimentally, we illustrate our ideas by manipulating a liquid barrel (a droplet of positive mean curvature) in a low-pinning, low-friction wedge geometry formed by lubricant-impregnated surfaces, where we quantify the relatively small dissipation caused by a departure from the energy-invariant equilibria.

Date:	**May 5, 2017**
Place:	**TBA**
Time:	**12:00**