



Post-doctoral position: Mechanical and numerical modeling of the partial wetting of soft materials.

Context: This work is part of a multi-scale modeling project funded by Labex (Lab of Excellence) "Science and Engineering for Advanced Materials and devices" (SEAM). This project regroups a dozen of permanent researchers from three different laboratories from Univ. Paris Diderot and Univ. Paris 13. Simulations ranging from the atomistic scale up to the component lengthscale are part of this project. The present postdoc subject is focussed on situations in which a wetting or dewetting front is interacting with a soft, more or less deformable material.

Description : A partially-wetting liquid can deform the underlying elastic substrate upon which it rests. This situation requires the development of theoretical models to describe the wetting forces imparted by the drop onto the solid substrate, particularly those at the contact-line, and also to rebuild the whole deformation 3D map of the substrate. More specifically, we are interested too in the study of the dynamics of a liquid contact line receding or advancing on a hydrophobic soft gel. Provided that the elastic modulus is small enough, a significant deformation takes place near the contact line, which in turn drastically influences the wetting behavior. Depending on the translation velocity of the substrate, the contact line exhibits different regimes of motions. Continuous motions are observed at high and low velocities, meanwhile two types of stick-slip motion (periodic and erratic) appear at intermediate velocities. In the receding case, these unsteady motions are presumably coupled with complex 3D shape changes of the contact line that remains to be understood.

We seek an outstanding person to research and develop novel methods at the interface of physics of soft matter, solid mechanics, rheology, applied mathematics and scientific computation, to solve the challenges involved in these complex behaviours.

Proposed by/ Contact persons : Dr. Laurent Limat, MSC, UMR 7057 CNRS, University Paris 7 ldlimat@gmail.com, and Prof. Ioan R. Ionescu, LSPM, University Paris 13, ioan.r.ionescu@gmail.com

Funding: As mentioned above, the position is part of the interdisciplinary project MEMMI of Labex SEAM (<http://www.labex-seam.fr/>). Expected grant ranges between 2100 and 2250 euros net per month.

Begining: bewteen 01.04 and 01.10.2015

Length: 15 months

Deadline for applications: 30.06.2015

Qualifications : Ph.D. in Physics, Mechanics, Mechanical engineering, Rheology and/or Applied Mathematics. The candidate will have to master several numerical methods, including, if possible, finite element technics.