ESPCI
Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05

Séminaire café - PMMH

Bureau d'Études, Batiment L, 2 ème étage

Jeudi 30 mars 2017, 13h30

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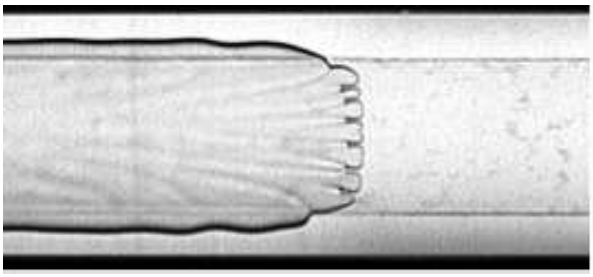
Viscous fingering under an elastic membrane

Injection of air in the thin liquid-filled gap between a rigid substrate and a flexible membrane gives rise to a blistering phenomenon : the membrane inflates, and the viscous liquid initially bonding it to the substrate lines the two separated surfaces of the blister. A peeling front is created at the edge of the blister, where the interaction of the two-phase displacement flow and the deformation of the membrane selects the shape of the peeling corner and the speed of the interface. Because the injected air is less viscous than the liquid, the peeling front is generally unstable to symmetry-breaking perturbations, and destabilizes in the shape of regular, finite-amplitude fingers. Such fingers can for instance be observed during the steady peeling of a strip of viscous adhesive, blistering in a radial compliant Hele-Shaw cell or the destabilization of the liquid meniscus formed in the partially-filled gap between two rotating cylinders (known as the printer's instability).
The shape of the fingering pattern is selected by the fluid mechanical instability (arising from a competition between viscous and capillary forces) and the angle of the corner in which the front propagates. By using a compliant Hele-Shaw channel, we create a steadily propagating planar peeling front. Varying the stiffness of the channel and the air injection rate allows us to provide a first simple scaling for the geometry of the fingers in terms of the peeling angle θ and the fluid parameter (capillary number Ca).



Prochain séminaire : jeudi 06 avril 2017 **à 13h30**,
Présentation rapide des post-doctorants au PMMH

Programme des séminaires café : https://www.pmmh.espci.fr/?-Seminaire-Cafe-Interne-
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