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Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05



Séminaire PMMH

Salle de réunion du PMMH, Campus Jussieu, Bâtiment Cassan A, 1^{er} étage

Vendredi 15 mars 2019, 11h00-12h00

Shreyas Mandre

Brown University, Providence

Surfactants driven out of equilibrium by a flow

A surfactant is a chemical compound that adsorbs onto a fluid-fluid interface and reduces its surface tension. A non-uniform distribution of such compounds at the interface causes a Marangoni stress that drives a flow, which in turn transports the surfactant. Estimating in situ the degree to which the adsorbed surfactant is out of equilibrium with the dissolved state is critical but challenging, especially because of the multiple length- and time-scales the surfactant and flow dynamics span. In this presentation, I show that combining asymptotic analysis of the governing mathematical model with experimental flow visualization and velocimetry can furnish a near-complete description of the dynamics.

An epitome of such a system is the axisymmetric flow driven by a steady point source of surfactant on the surface of a deep liquid pool. In this case, the state of the surfactant is difficult to gauge, without which even simple order-of-magnitude scaling theories remain incomplete. I show that by examining three invariant characteristics of the flow, and without knowledge of the surfactant physicochemical parameters, the nature of the surfactant dynamics can be deduced.

Prochain séminaire : vendredi 22 mars 2019, Monica Martinez Wilhelmus (Univ. of California Riverside)

Programme des séminaires : www.pmmh.espci.fr, onglet *Séminaires PMMH*

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