Anuncio de Seminario

Fecha: miércoles 21 de febrero de 2024, 12:30 horas
Lugar: Sala B, Planta -1 de la Facultad de Humanidades (Paseo de la Senda del Rey, 7)
Telemáticamente a través de Teams.

Complex dip-coating flows: elastic-like interfaces and double liquid films

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Dip-coating consists in depositing a thin liquid film onto a solid substrate pulled out of a liquid bath at controlled speed. In the case of a pure Newtonian liquid, the thickness of the coated film was successfully predicted by the theory developed by Landau & Levich and Derjaguin in the 1940's. In this seminar, I will present two recent theoretical and experimental developments on dip-coating flows: (i) in the case where the liquid/air interface has an elastic-like behavior, due to the presence of surfactants, and (ii) in the case where the dipping bath contains two immiscible liquids. First, I will propose "twin" hydrodynamic models neglecting surfactant transport to the interfaces to describe the dip-coating of films onto a solid plate (Landau–Levich– Derjaguin configuration) as well as soap film pulling (Frankel configuration). Experimental data on the entrained film thickness in both configurations can be robustly fitted using a single value of the surface Gibbs-Marangoni elasticity, which is in good agreement with independent measurements performed in a Langmuir trough. Second, I will present an extension of the Landau–Levich–Derjaguin theory to the case where the dipping bath contains two immiscible liquids, one lighter than the other, resulting in the entrainment of two thin films on the substrate. I will report how the thicknesses of the coated films depend on the dimensionless parameters of the problem and show evidence that they are essentially determined by the local viscous and capillary stresses at the liquid/liquid and liquid/air interfaces, at the point where these are the closest.

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