LadHyX Seminar – January 10th, 10:30

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Flow over textured surfaces: From drops to liquid films

Understanding fluid flow over complex surfaces – such as plant leaves, sand, skin, cloth, or paper – is an ongoing challenge with implications for health, agriculture, energy, and other areas. Surfaces have a variety of microscale texture patterns, making it a challenge to predict macroscopic flow behavior. We will discuss two cases where textured surfaces modify flow, introducing flow regimes not observed on smooth surfaces. In the first example, we experimentally observe how dip coating flow is affected by micropillar arrays with varying periodicity. A homogenization-based model reduces the texture complexity, while still accurately describing the flow physics. In the second example, we examine a system with 'temporal texturing': a drop bouncing on a vibrating flat surface. The drop sustains a prolonged hovering state and we observe two characteristic states governed by the vibration frequency. A harmonic oscillator model coupled to drop deformation predicts experimentally-observed behavior. We will briefly describe how lessons learned from our measurements and homogenization-based model inspire further avenues of study for systems such as spin coating and drop spreading on complex surfaces.