Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Surface wakes on soft solid interfaces

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A moving, localized source of disturbance on a fluid interface can generate propagating surface waves whose constructive interference leaves behind observable wake patterns, as seen behind a swimming duck in water. In contrast, typical stiff elastic solids can sustain such wake patterns only in extreme length scales: either microscopic or planetary. Ultrasoft solids such as hydrogels and biological tissues, however, resist small shear forces: they are far less rigid compared to stiff solids, yet not as resistance-free as fluids. As a result, these soft solids make it possible to realise such wake patterns on elastic solids at laboratory scale. We present a theoretical model which unifies the classical theories of surface waves in fluids and solids to characterise the dynamical response of the free surface of a hydrogel slab through the wake patterns observed in our experiments. Such wake pattern characterisation can potentially serve as a natural, non-invasive diagnostic tool to infer the elastic strength of soft materials.

Tuesday, May 19th 2026

14:30 Hrs (Tea / Coffee 14:15 Hrs)

Auditorium, TIFRH