

ICTS Colloquium

Title : Surfactants driven out of equilibrium by a flow

Speaker : Shreyas Mandre, Brown University, USA

Date : Monday, January 7, 2019

Time : 11:30 AM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : A surfactant is a substance that adsorbs onto a fluid-fluid interface and reduces its surface tension. A non-uniform distribution of surfactant at the interface causes a Marangoni stress that drives a flow with multiple length- and time-scales, 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 remains challenging.

An epitome of such a case 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. In this presentation, 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.