

## **ICTS Fluid Dynamics Seminar**

**Title** : Bacterial and Microtubular Hydrodynamics

**Speaker** : Debasish Das (University of Strathclyde, UK)

**Date** : Tuesday, 25<sup>th</sup> June 2024

**Time** : 12:00 PM (IST)

**Abstract** : In this talk, I will discuss two topics: swimming bacteria near surfaces and cytoplasmic streaming in egg cells. Flagellated bacteria are hydrodynamically attracted to rigid walls, yet experiments show a 'hovering' state where they swim stably at a finite height above surfaces. We use simulations to reveal the physical origin of hovering and develop a minimal model that reconciles near and far-field hydrodynamics, capturing all key features of this phenomenon.

The latter part focuses on the fluid dynamics of *Drosophila* oocytes (egg cells), which exhibit rotating flows generated by flexible microtubules, known as cytoplasmic streaming. This process is crucial for establishing polarity and promoting cytoplasmic mixing. The minus ends of microtubules are anchored at the oocyte cortex, and kinesin-cargo complexes move along these microtubules, generating streaming flows in the viscous cytoplasmic fluid. I will show how a fluid-structure elasto-hydrodynamic instability of these microtubules explains cytoplasmic streaming.

**Venue** : Feynman Lecture Hall

Zoom Link: <https://icts-res-in.zoom.us/j/94481315016?pwd=29gPbrZb4KvpLW0xPYvKOGMFEKfbAv.1>

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