

LadHyX Seminar – November 25th, 10:45

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From One to Many: Two Problems on fluid-structure Interactions at low Reynolds number

An important class of microscale fluid-structure interactions in physics and biology involves the interactions and deformations of flexible elastica, both passive and active, with ambient fluid flows. Examples include the swimming of microorganisms using internally actuated cilia or flagella and the transport of material by the coordinated action of ciliary carpets. I will discuss two problems concerning the dynamics of flexible filaments in flows. First, I will talk about the novel buckling instabilities and complex shapes of single-actin polymers in simple flows and their importance in the rheology of complex fluids. The second example will be concerned with a collective fluid-structure interaction problem and the emergence of spontaneous swirling flows observed in the egg cells of the fruit fly *Drosophila melanogaster*. To explain such collective dynamics, I will present a coarse-grained active carpet theory that probes hydrodynamics in a bed of anchored fibers.