

MOTION AND STASIS IN CELLULAR SUSPENSIONS AND SELF-PROPELLED SWARMS

LAKSHMINARAYANAN MAHADEVAN, HARVARD UNIVERSITY

I will discuss two problems, one motivated by disease, and the other by toys. (i) Sickle cell disease was the first disease to have its molecular cause identified - a single point mutation that renders hemoglobin susceptible to polymerization, and thence allow cells to change their stiffness and jam in capillaries; the resulting hemostasis is the pathophysiological precursor of all symptoms of the disease. I will tell you about our attempts to integrate experiments and theory to understand the biophysics of the disease, along with some implications for clinical medicine. (ii) The patterns generated by collective motion of self-propelled objects has led to a large, primarily theoretical, literature. I will discuss our experiments and theory to probe some of the questions that these studies raise, with an emphasis on the role of confinement and topography on the collective motion and stasis of bristlebots - toothbrushes driven by cell phone motors.