PHYSICAL MATHEMATICS SEMINAR

ENHANCING MICRON-SCALE TRANSPORT THROUGH SWIMMER DESIGN AND GEOMETRIC CONSTRAINTS

ERIC KEAVENY

Courant Institute of Mathematical Sciences
New York University

ABSTRACT:

I will discuss two interesting problems exploring the role of geometry and shape in low Reynolds number locomotion. The first concerns the optimal design for magnetically actuated micro-swimmers currently being fabricated and studied for biomedical applications. Posing this as an infinite-dimensional optimization problem, we address experimentally realizable morphologies and show that attached payloads have a significant effect on their optimal shape. The second problem deals with how solid obstacles embedded in a fluid affect the locomotion speed of undulating bodies. In a combined numerical and experimental study, we examine the dynamics of the small nematode and model organism *C. elegans* through a square lattice of micro-pillars. We demonstrate that the interactions with the obstacles allow simple undulators to achieve speeds as much as an order of magnitude greater than their free-swimming values, and that what appears as behavior and sensing can sometimes be explained through simple mechanics.

TUESDAY, FEBRUARY 15, 2011
2:30 PM
Building 2, Room 105

Refreshments at 3:30 PM in Building 2, Room 290

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