PHYSICAL MATHEMATICS SEMINAR

Coarse-grained models for interacting flapping swimmers

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ABSTRACT:

I will present the results of a theoretical investigation into the dynamics of interacting flapping swimmers, the goal being to understand how fluid mechanics may mediate schooling and flocking behavior. Our study is motivated by ongoing experiments in the NYU Applied Math Lab, in which freely-translating, heaving hydrofoils interact hydrodynamically to choose their relative positions and velocities. We develop a discrete dynamical system in which flapping swimmers shed point vortices during each flapping cycle, which in turn exert forces on the swimmers. We present a frame work for finding exact solutions to the evolution equations and for assessing their stability, giving physical insight into the preference for certain observed "schooling states." Generally, our results suggest that the structure and dynamics of animal groups may be interpreted using hydrodynamic principles.

TUESDAY, FEBRUARY 21, 2017
2:30 PM
Building 2, Room 147

Reception following in Building 2, Room 290
(Math Dept. Common Room)

http://math.mit.edu/seminars/pms/

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