COMPUTATIONAL MODELS OF SELF-PROPELLED MICROORGANISMS

COLLOQUIUM SERIES

Ricardo Cortez

PENDERGRAFT WILLIAM LARKIN DUREN PROFESSOR
MATHEMATICS DEPARTMENT
TULANE UNIVERSITY

MONDAY, AUG. 22 – 4:30PM

WEXLER HALL - WXLR 21 (lower level)

Many interesting biological phenomena involve rigid or flexible thin filaments interacting with a fluid. Some examples are the motion of bacteria swimming through the actuation of flagella, the coordinated motion of cilia, the swimming of spermatozoa, and artificial self-propelled microswimmers. Of particular interest is the interaction of filaments with nearby surfaces or moving through regions in the fluid containing elastic polymers, since these environments commonly found in nature. I will present work on computational models of microscopic filaments moving in a fluid based on recent advances of the method of regularized Stokeslets. The method is based on fundamental solutions of linear partial differential equations, modified to remove the singularities. I will show results from simulations of flagellar motions with asymmetric beat patterns and the effect of swimming near a solid surface. Recent work on models of swimming through viscoelastic regions incorporate the effect of the elastic polymers immersed in the fluid using a network of cross-linked nodes where each link is modeled by a simple viscoelastic element. The presentation will be expository; no previous experience in computational fluid dynamics or biological flows is necessary.

School of Mathematical and Statistical Sciences
Arizona State University

This event is free and open to the public.

math.asu.edu/events