Applied Mathematics COLLOQUIUM: Computational Models of Self-Propelled Microscopic Elastic Filaments in a Viscuous Fluid with Biological Applications

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Date:
10/16/2020

Time:
3:00 PM - 4:30 PM

Link:

Please email snsgradstaff@ucmerced.edu for Zoom link and passcode

About the Speaker

Ricardo Cortez is Chair and Professor of the Mathematics Department and Director of the Center for Computational Science at Tulane University in New Orleans. He received BS degrees in mathematics (1986) and mechanical engineering (1988) from Arizona State University and his PhD degree in applied mathematics from the UC Berkeley in 1995. Before Tulane, Ricardo spent three years as an NSF postdoctoral researcher and Courant Instructor at the Courant Institute of Mathematical Sciences in New York University. Currently he spends his time in Zoom meetings!

Abstract:

The motion of microorganisms through the actuation of flagella, the coordinated motion of cilia, and the swimming of spermatozoa are examples of interesting biological phenomena involving thin flexible filaments interacting with a fluid. I will present computational models of microscopic filaments in a fluid based on recent advances of the method of regularized Stokeslets. Examples will include simulations of sperm motility that shed light on the effect of asymmetry in the flagellar beat patterns and on interactions with a nearby surface, which is important in fertilization. Effects of elastic polymers immersed in the fluid are incorporated through a network of cross-linked nodes where each link is modeled by a simple viscoelastic element If time allows I will also present ongoing work with passive fibers in shear flows.

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