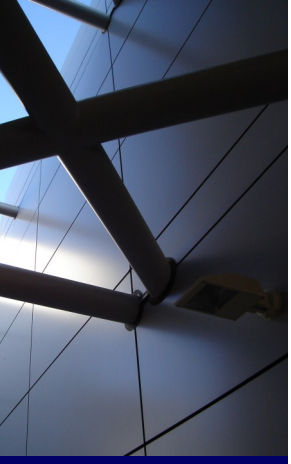

COLLOQUIUM
MECHANICAL ENGINEERING

The Department of Mechanical Engineering presents:

Tamar Shinar, Ph.D.

Assistant Professor, Computer Science and Engineering
University of California Riverside

Friday, October 14, 2011
11:10AM-12:00PM
Bourns Hall A265

Numerical studies of microtubule-based motion in the single-celled C. elegans embryo

Abstract

We develop a simple model of microtubule-based pronuclear motion in a single-celled C. elegans embryo. The model consists of a model for microtubule dynamic instability, a Newtonian, viscous fluid contained within an enclosing geometry for the cytoplasm, a rigid body for the pronucleus, and a motor protein load-velocity relationship. Motor proteins distributed throughout the cytoplasm interact with microtubule filaments by sliding along them with a velocity that depends on their load. They in turn pull on the filaments, resulting in translation of the microtubule-bound pronucleus. Our simulations show pronuclear migration, and moreover, a robust pronuclear centration and rotation very similar to that observed in vivo. I will also describe the numerical method for the coupled simulation of the Stokes fluid and rigid structures.

Biography

Tamar Shinar is the Amrik Singh Poonian Assistant Professor of Computer Science and a member of the Riverside Graphics Lab. Dr. Shinar's research focuses on simulation and modeling for computer graphics and biology. She received her Ph.D. in Scientific Computing and Computational Mathematics from Stanford University in 2008, where she developed algorithms for physically-based simulation in computer graphics. Prior to joining the CS&E faculty, she was a postdoctoral scholar the Courant Institute of Mathematical Sciences at NYU.