PURDUE
UNIVERSITY

*School of Aeronautics and Astronautics and School of Mechanical Engineering*

*The Midwest Mechanics Seminar Series*

# Bacterial Microfluidics - The science and engineering of bacterial flagellar propulsion

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Friday, March 30, 2007
2:30 p.m.
ME 116

**Abstract**
Flagellated bacteria, such as E. Coli, propel themselves using multiple flagella - long, thin helical filaments - that are rotated using nanoscale motors. We will discuss several aspects of the fluid mechanics associated with bacterial motility, studied using scale modeling, numerical simulations and microscale experiments. The phenomena explored include the mechanics of flagellar bundling, in which several distinct filaments combine into a single helical bundle via viscous hydrodynamic interactions, the flow fields associated with viscous helical motions, and mechanisms for hydrodynamic synchronization of adjacent flagella motion. We will also show how the flagella motion can be harnessed in engineered systems to enhance low Reynolds number mixing, to pump fluids, and to transport objects through microfluidic systems.

**BIO**
Education:
ScB, Brown University (Mech. Eng.) 1982;
PhD, MIT (Aeronautics and Astronuatics) 1988;

Professional Appointments:
Post Doc, Brown University, Applied Mathematics, 1988 - 1990
Assist, Assoc Prof, MIT (Aeronautics and Astronatuics) 1990 – 1999
Assoc, Full Prof; Brown University, Engineering, 1999 –

Research Interests:
Fluid Mechanics, including Micrometer and Nanometer scale flow physics, bacterial motion, Animal Flight and Shear flow control.

***An informal coffee & cookie reception will be held prior to the lecture at 2:00 p.m. in GRIS 390***