CENTER FOR FLUID MECHANICS
AND
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP
OF
THE DIVISION OF ENGINEERING
SEMINAR SERIES

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Dynamics of Complex Fluids in Microfluidic Devices

Microfluidics has become an important enabling technology for rapidly analyzing and separating biomolecules, synthesizing new materials, and performing fundamental studies on single molecules or colloids. Using fields and flows, these microfluidic devices can create unique environments to transport complex macromolecules and assemble field-responsive colloids. In this seminar, we will discuss how single molecule microscopy, scaling theory, and Brownian dynamics simulations can be combined to study the transport of large DNA molecules in microfluidic devices. We will concentrate on our studies of DNA electrophoresis in electric field gradients and arrays of posts. A formal analogy between DNA deformation in hydrodynamic flows and electric fields will be discussed, which allows us to develop theories to predict DNA deformation and also design a new method for stretching DNA. We will show how a fundamental understanding of these systems impacts DNA mapping technologies and pathogen detection systems.

TUESDAY APRIL 12, 2005
Barus & Holley, Room 190
4:00 PM