Center for Fluid Mechanics, Division of Applied Mathematics
Fluids, Thermal and Chemical Processes Group, School of Engineering
Joint Seminar Series

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Experiments in Microfluidic Stagnation Point Flows: Opportunities for Trapping, Deforming, and Analyzing DNA, Vesicles and Other Microscale Objects

We have designed and fabricated a series of microdevices that create stagnation points at which microscale objects, such as DNA, vesicles, cells, or drops, may be trapped and subjected to flow forces. In the simplest of these, the cross-slot, DNA may be trapped and stretched in a planar extensional flow to a steady-state extension that is determined by the flow strength, as demonstrated by the pioneering work of Chu and co-workers (Science, 276, 1997). We will present three extensions of this idea: 1) the use of stagnation point flows for single molecule sequence detection and studies of enzyme binding kinetics on DNA, 2) the design and use of more complex devices to allow the systematic variation of flow type as well as flow strength near the stagnation point (the "microfluidic four-roll mill") , and 3) the use of the microfluidic four roll mill for studies of the dynamics of DNA and vesicles in mixed flows.

Tuesday September 21, 2010
3:00 PM
Barus & Holley Room 190