SCHOOL OF CHEMICAL, BIOLOGICAL & MATERIALS ENGINEERING
And
UNIVERSITY OF OKLAHOMA BIOENGINEERING CENTER
The University of Oklahoma
Norman, Oklahoma
2007 – 2008 Seminar Series

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DR. SATISH KUMAR
ASSOCIATE PROFESSOR
DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF MINNESOTA
MINNEAPOLIS, MINNESOTA

Will present a seminar on

"MICROSCALE FLOW AND TRANSPORT PROBLEMS ARISING IN SURFACTANT RHEOLOGY, PRINTING PROCESSES AND POLYMER ELECTROPHORESIS"

Fluid flow and transport processes occurring on length scales of microns or less often involve phenomena which are unimportant at larger length scales. Although such phenomena can complicate our ability to understand and design microscale flow and transport processes, they also offer opportunities to engineer novel and useful effects. Three examples will be presented in this talk in support of this idea. In the first example, we consider an instability that arises when a fluid flows past a soft elastic solid. Experiments and theory suggest that this instability is responsible for certain rheological phenomena observed in surfactant solutions, and that it may also be useful for enhancing mixing in microscale flows. In the second example, we consider the displacement of one thin liquid film by another on a chemically patterned surface. Numerical simulations using a lubrication-theory-based model indicate a mechanism by which one liquid can be emulsified into the other, a step which is known to play a key role in lithographic printing processes. In the third example, we consider polymer electrophoresis through a narrow constriction. Brownian dynamics simulations show that the relationship between chain transit velocity and chain length depends in a sensitive way on the constriction geometry and applied electric field strength, and is controlled by an interplay between three distinct time scales.

THURSDAY, AUGUST 23, 2007
SEMINAR -- 2:30 P.M.
COOKIES AND COFFEE -- 3:30 P.M.
SARKEYS ENERGY CENTER, ROOM M-204

THIS IS A REQUIRED SEMINAR FOR CHE 5971