

Flows with Soluble Surfactant or Electrokinetic Effects

11:30 Friday Sept 3

<https://njit.webex.com/njit/j.php?MTID=m4f9b457fcc5d858430b41d6e909618ae>

Abstract: Surfactants are energetically favored to seek out the interface between immiscible fluids, where they influence the dynamics of the interface by reducing its surface tension. Surfactants can also occur in dissolved form away from the interface and transfer between interfacial and bulk forms. Because surfactant molecules are large relative to solvent molecules they diffuse very slowly relative to other time scales such as the relaxation time associated with surface tension. Electrokinetic flows, on the other hand, consist of a strong electrolyte solution, meaning that the solute is almost completely disassociated into ions, in the presence of an electric field. The solution is charge-neutral except near an interface between immiscible electrolytes, where the electric field induces separation of charge to occur in thin Debye layers, and the Coulomb force acting on the separated charge induces flow. These are both examples where a spatially narrow boundary layer or transition layer develops adjacent to a sharp fluid-fluid interface, and where the layer exerts a substantial element of control over the flow's evolution and dynamics. Asymptotic techniques are introduced that allow reduction of the governing equations to a more tractable form that resolves the layer dynamics but nonetheless needs numerical solution. Various physical examples will be presented. This is collaborative work with Michael Siegel and a number of past and present doctoral students and postdocs in DMS.

Speaker

Michael

Booty

DMS

NJIT