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

TUESDAY – February 5, 2013
3:00pm
Barus & Holley, Room 190

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A review of viscoelastic flow past rising bubbles and droplets

The slow flow of viscoelastic liquids around rising air bubbles and around Newtonian and non-Newtonian droplets is presented. In the case of air bubbles, particular attention is given to the sudden rise in velocity at a given critical bubble volume. The onset of this velocity jump is analyzed as a balance between viscous, elastic and surface tension forces. The effect of fluid elasticity is examined and compared to the case of purely viscous and inelastic power law liquids. Once the flow around bubbles is understood, attention is given to our current investigation of viscoelastic droplets rising in non-Newtonian fluids. Initial results are presented for Newtonian droplets and deformable viscoelastic droplets rising in both Newtonian and viscoelastic fluids. A comparison between bubbles and droplets is established and the appearance of a negative wake and its connection to a tail formation and break-up behing the droplet is also shown. Some curious results will be shown for cases in which inertia effects become important.