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

TUESDAY – March 13, 2012
4:00pm
Barus & Holley, Room 190
Refreshments will be served in the Lobby of Barus & Holley following the seminar

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Non-equilibrium Statistical Mechanics of Cluster-cluster Aggregation

Consider a large cloud of particles which are moved around in space by a random transport process such as diffusion. If these particles are "sticky" so that they clump together irreversibly upon contact then the resulting distribution of cluster sizes evolves in time since smaller clusters stick to each other to produce larger ones. The statistical dynamics of such sticky particles has applications in surface physics, colloids, granular materials, bio-physics and atmospheric science. It also provides a rich variety of non-equilibrium phenomena for theoretical analysis. One of the most striking of these phenomena is the so-called gelation transition which, roughly speaking, corresponds to the generation of clusters of infinite size in a finite time. In this talk, I will discuss the scaling theory of cluster aggregation at the level of mean field theory and explain the meaning of the gelation transition. At the end I will discuss the somewhat mysterious phenomenon of "instantaneous" gelation and its relation to some problems in cloud physics.