CENTER FOR FLUID MECHANICS
AND
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP
OF
THE DIVISION OF ENGINEERING
SEMINAR SERIES

Michael Miksis
Department of Engineering Sciences and Applied Mathematics
Northwestern University
Evanston, IL

Moving Boundary Problems Associated with Biopreservation by Desiccation

This talk will focus on several moving boundary problems associated with the preservation of cells by drying. Nature has provided us with a host of desiccation-tolerant organisms. Characteristic to each is the accumulation of internal sugars, e.g., trehalose, which are believed to play a major role in the success of the drying and rehydration process. When a sugar-water mixture dries, a glassy state is formed. Diffusion of water through this glassy region is anomalous and can be modeled by a fractional diffusion equation. The growth of the glassy region is central to the drying process. Analytical and numerical solutions of this moving boundary problem will be presented for several limiting cases. We will also formulate a hydrodynamic model of the drying process associate with a single cell. Limiting steady states and their stability will be discussed.

TUESDAY, March 15, 2011
Barus & Holley, Room 190
4:00pm