PHYSICAL MATHEMATICS SEMINAR

TOPIC: HOW THE VENUS FLYTRAP SNAPS

SPEAKER: JAN SKOTHEIM
University of Cambridge

ABSTRACT:

The rapid closure of the carnivorous plant Venus flytrap (Dionaea muscipula) is one of the fastest motions (typically 100 ms) in the plant kingdom and led Darwin to describe the plant as one of the most wonderful in the world. The closure is initiated
by the mechanical stimulation of trigger hairs acting as mechanosensors. Previous studies have focused on the biochemical response of the trigger hairs to stimuli and quantified the propagation of an action potential in the leaves. Here, we complement the biochemical studies by considering the post-stimulation mechanical aspects of Venus flytrap closure. Using high-speed video, microscopy, and force measurements we find experimental evidence supporting our hypothesis that the fast closure of the trap results
from a mechanical buckling instability, which we quantify in terms of a simple model. This resolves the controversy surrounding the mechanism of rapid closure in the Venus flytrap, and provides a framework for how rapid motions can be generated in plants.

TUESDAY, MAY 4 2004
2:30 pm
Building 2, Room 338

Refreshments will be served at 3:30 PM in Room 2-349

Massachusetts Institute of Technology, Department of Mathematics, Cambridge, MA 02139