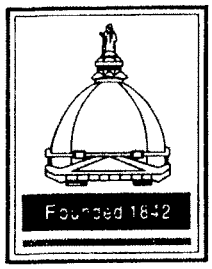
AEROSPACE & MECHANICAL ENGINEERING



2010 COLLOQUIUM 2011

SEMINARS ARE OPEN TO THE PUBLIC

INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365 FITZPATRICK HALL

UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

MIDWEST MECHANICS SEMINAR

SPEAKER: **Professor Timothy J. Healey**
Department of Mathematics and
Department of Mechanical & Aerospace Engineering
Cornell University
Ithaca, New York

TOPIC: **STABLE EQUILIBRIA OF SOME 2-PHASE PROBLEMS OF NONLINEAR ELASTICITY VIA GLOBAL BIFURCATION**

DATE: Tuesday, October 26, 2010

TIME: 3:30 p.m.

PLACE: 136 DeBartolo Hall

ABSTRACT

We consider 3 problems from nonlinear elasticity modeling various 2-phase phenomena: wrinkling of thin elastic sheets, shear-induced phase transition in shape-memory alloys, and pressurized Giant Unilamellar Vesicles (GUV's). We identify a common mathematical structure in the elastic potential energy density for each of these: a convex term in the second-gradient of the deformation - characterized by a multiplicative small parameter - plus a non-convex term in the first gradient. E.g., the small parameter is directly related to the thickness of the structure in the first and third problems mentioned above. Using global bifurcation theory combined with a-priori bounds, we obtain the existence of solutions corresponding to arbitrarily small, non-zero values of the parameter. With this in hand, we are able to efficiently compute branches of such solutions, identifying those that render the total energy a local minimum (stable). We give applications to the above mentioned problems.

NOTE: *If you are interested in meeting individually with Prof. Healey, please contact Evelyn at 631-5431.*