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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.