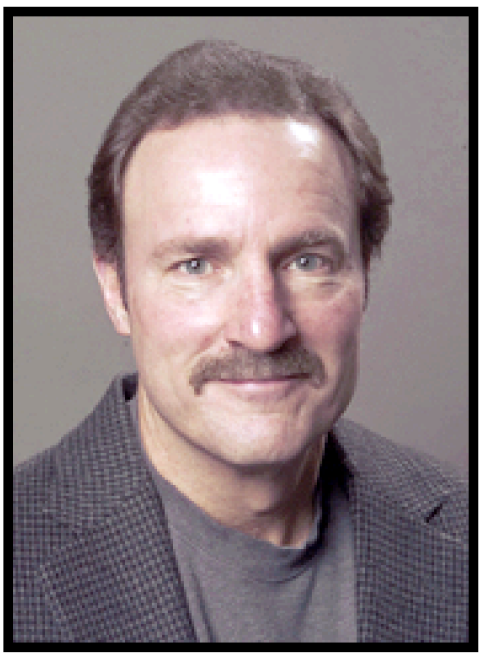
The Oliver Club

www.math.cornell.edu/~oliver/

Timothy Healey, Cornell University

Energy Minimizers as Weak Solutions in Second-Gradient Nonlinear Elastostatics

We begin with the setting of classical nonlinear elastostatics, which is the central model for finitely deforming solid bodies. In spite of its roots going back to Cauchy, the theory presents many open problems. In particular, we discuss the apparent incompleteness of all known approaches to general existence, including the famous minimum-energy results of J. Ball and some global-continuation results of the speaker. One possible remedy is to incorporate a second-gradient term, representing "interfacial energy," into the model. We consider a special class of such models here. While the existence of an energy minimizer is routine, the existence of a weak solution is not. We focus our efforts on the latter, establishing the existence of a weak solution to the Euler-Lagrange equilibrium equations. We indicate how our results hold for a general class of boundary value problems, including "mixed" boundary conditions.



Thursday, February 12, 2009
at 4:25 PM in 251 Malott Hall

Refreshments will be served at 3:55 PM in the Mathematics Department lounge (532 Malott Hall).