

1099-35-94

**Patricia Bauman\*** (bauman@math.purdue.edu), Purdue University-Math Dept., 150 No. University Street, West Lafayette, IN 47907, and **Andrea Rubiano**, Princeton Consultants, 2 Research Way, Princeton, NJ 08540. *Energy-Minimizing Nematic Elastomers*. Preliminary report.

We prove weak lower semi-continuity and existence of energy-minimizers for a free energy describing stable deformations and the corresponding director configuration of an incompressible nematic liquid-crystal elastomer subject to physically realistic boundary conditions. The energy is a sum of the trace formula developed by Warner, Terentjev and Bladon (coupling the deformation gradient and the director field) and the bulk term for the director with coefficients depending on temperature. A key step in our analysis is to prove that the energy density has a convex extension to non-unit length director fields. Our results apply to the setting of physical experiments in which a thin incompressible elastomer in  $R^3$  is clamped on its sides and stretched perpendicular to its initial director field, resulting in shape-changes and director re-orientation. (Received January 29, 2014)