

Biographical Sketch of Timothy J. Healey

Education: Healey holds engineering degrees from the University of Missouri, Columbia (BS 1976) and the University of Illinois, Urbana-Champaign (MS 1978, PhD. 1985). He was a licensed structural engineer at Agbabian Associates in the Los Angeles area in 1978-1980 between his MS and PhD studies. He completed his PhD at UIUC under the guidance of Robert Muncaster from the Math Department, with dedicated mentoring from Arthur Robinson and Donald Carlson in mechanics. He spent a post-doctoral year with Stuart Antman at the University of Maryland in the Math Department before joining the Cornell faculty in 1985.

Research Highlights: Healey pioneered the use of group-theoretic methods in *global* bifurcation problems with symmetry at the start of his career. This opened doors to both efficient numerical methods in computational bifurcation problems^{3,8,12,23,69} * and detailed analyses of solutions of nonlinear elliptic PDE based on symmetry and nodal properties^{5,13,20,22}. He later developed a nonlinear Fredholm degree to prove the existence of solution continua “in the large” in nonlinear elasticity^{27,28,33,38,62} and formulated models for chirality in Cosserat-rod theory with subsequent analyses^{36,39,40,50,51}. His recent contributions include: (1) proving the existence of weak injective solutions for a general class of 2nd-gradient nonlinear elasticity in the presence of unbounded growth in the energy density function as the local volume ratio approaches zero^{48,67} - including the treatment of self-contact⁵⁹; (2) the modeling and analysis of thin elastic surfaces - in particular, uncovering new phenomena in the wrinkling of highly stretched thin sheets^{52,56,61}, establishing the existence of global symmetry-breaking solutions in fluid-elastic (lipid-bilayer) vesicles^{54,58} along with their computation⁵⁷, and proving new existence theorems for elastic Cosserat surfaces^{67, 70,72,73}; (3) a completely new approach to the analysis of fracture in solids based on the inverse-deformation formulation^{66,71, 74, 76}.

Academics & Awards: At Cornell Healey has held positions in the Department of Theoretical & Applied Mechanics (1985-2008), including Chair of that department (2000-2008), and in the Departments of Mathematics and Mechanical & Aerospace Engineering (2009-2014). He currently holds a full-time appointment in the Department of Mathematics. A total of 20 students have obtained their PhD degrees under his supervision. Throughout his career, he has given numerous invited presentations and keynote addresses and has enjoyed nearly continuous support from the National Science Foundation (DMS) for his research. He is the recipient of four teaching prizes at Cornell. He serves on several editorial boards and has served in various leadership roles on committees and organizations representing the science of mechanics. He has held numerous visiting positions, including distinguished visiting professorships at Universidad de Los Andes (Bogotá, Colombia) and Ecole Polytechnique (Palaiseau, France).

*See “Publications of Timothy J. Healey”