

**MECHANICAL ENGINEERING DEPARTMENT**  
**ME/ISyE 8773-8774**  
*Co-Sponsored by Biomedical Engineering*

**Finite Element Modeling: Bones and Eyes**

by

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**Wednesday, September 12, 2007**  
**3:15 p.m. — Refreshments before the seminar**  
**3:30 p.m. — Graduate Seminar**  
**Room 2-101 Hasselmo Hall**

**ABSTRACT** — A key challenge for engineers in pursuit of progress in tissue mechanics is the characterization of the mechanical behavior of biological tissues due to mechanical forces. This talk will focus on the mechanical structure-function behavior of two quite different tissues: bones and eyes. For bone, an overview of the adaptation of living tissue to mechanical usage will be highlighted, along with techniques to understand and model bone and its adaptive responses at the organ (continuum) level.

For the eye, the focus will be upon the optic nerve head. The optic nerve head is the small portion in the back of the eye through which the major nutrient vessels pierce the sclera and through which the neural tissues exit to connect to the brain. Abnormally high fluid pressure in the eye can deform the nerve head, and progressive loss of vision can result (glaucoma). Progress in understanding the structure-function behavior of the optic nerve head will be described based on 3-D geometries of continuum and discrete finite element models.

**BIO** — Rich Hart grew up in Wilmington, Delaware and earned B.E.S. (Bachelor of Engineering Science, 1975) and M.S. (Engineering Mechanics, 1977) degrees from the Georgia Institute of Technology in Atlanta, Georgia. Georgia Tech subsequently awarded him a yearlong World Student Fund scholarship to study Biomechanics at the Technische Universität in Berlin (West) Germany from 1977-78. Upon his return, he enrolled in the Department of Mechanical and Aerospace Engineering at Case Western Reserve University in Cleveland, Ohio (Ph.D. awarded January 1983).

He joined the faculty in Tulane's Department of Biomedical Engineering as an Assistant Professor in December 1982. He served as Department Chair at Tulane's Department of Biomedical Engineering from 1997-2006, and in 2001 was appointed as the Alden J. "Doc" Laborde Professor of Engineering. He joined the faculty of Biomedical Engineering at the Ohio State University as the Edgar C. Hendrickson Professor and Department Chair on July 1, 2006.

His research interests are in finite element analysis of biological tissues and structures, with a primary focus on work that seeks to describe, simulate, and predict the response of bone tissue to mechanical stimuli. In addition, he has collaborated on research projects in brain physics, spine mechanics, and most recently in ophthalmology, concentrating on the biomechanics of the optic nerve head and its role in glaucoma. In 1999, he was elected a Fellow of the Institute for Medical and Biological Engineering and in 2001 he was honored with the American Society for Engineering Education's Theo C. Pilkington Outstanding Educator Award. He has been awarded the Tulane Department of Biomedical Engineering Outstanding Teacher-of-the-Year award, and received the Society of Tulane Engineer's Lee H. Johnson award for teaching excellence. In 2006 was elected to the board of directors for the Biomedical Engineering Society.

Informal Faculty Luncheon: Wednesday, September 12, 2007, 12:00 noon. Meet in 1100 ME and walk to lunch with other faculty. Prof. Richard Hart will be able to attend.