MECHANICS RESEARCH COMMUNICATIONS

Elsevier Distinguished Lecture

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GITC 1100
New Jersey Institute of Technology, Newark, NJ
Webcast URL: To be announced

Interstitial Flow in the Hierarchical Pore Space Architecture of Bone Tissue

A model for poroelastic materials with hierarchical pore space architecture and compressible constituents undergoing small deformations is described. The model is applied to the problem of determining the exchange of pore fluid between the vascular porosity and the lacunar-canalicular porosity in bone tissue due to cyclic mechanical loading and blood pressure oscillations. The result is basic to the understanding of interstitial flow in bone tissue that, in turn, is basic to understanding of nutrient transport from the vasculature to the bone cells buried in the bone tissue and to the process of mechanotransduction by these cells. Understanding mechanotransduction in bone tissue is important for designing systems to combat bone loss due to osteoporosis and long-term space flight and for the design of bone implants.

Stephen C. Cowin is a City University of New York Distinguished Professor at the City College of New York, Grove School of Engineering, a position he has held since 1988. In the years before that he was at Tulane University where his title in later years was Alden J. Laborde Professor of Engineering. At both universities he held appointments in Biomedical Engineering and in Mechanical Engineering. Professor Cowin received his BES and MS in Civil Engineering from Johns Hopkins University in 1956 and 1958, respectively, and his Ph.D. in Engineering Mechanics from the Pennsylvania State University in 1962. After one year on the faculty at the Pennsylvania State University, he began a 25-year-long association with Tulane University in 1963. His principal research interest is the mechanics of materials, particularly in determining the influence of microstructure on the gross mechanical behavior of granular, composite, and biological materials. Professor Cowin has also been Professor-in-Charge of the Tulane/Newcomb Junior Year Abroad Program in Great Britain. In 1985 he received the Society of Tulane Engineers and Lee H. Johnson Award for Teaching Excellence. He was also the recipient of the Best Paper Award from the Bioengineering Division of the American Society of Mechanical Engineers (ASME) in 1992; of the Melville Medal from the ASME in 1993, and of the European Society of Biomechanics Research Award in 1994. In 1999 he received the H. R. Lissner medal of the ASME for contributions to biomedical engineering. In 2004 he was elected to the National Academy of Engineering and also received the Maurice A. Biot medal of the American Society of Civil Engineers (ASCE).

Professor Cowin is the author of over 250 research papers and editor or co-editor of five books. He has published two senior/first graduate year textbooks; one entitled *Tissue Mechanics (2007,* with Stephen B. Doty) and *Continuum Mechanics of Anisotropic Materials* (2013). He is presently or has been a Regional Editor for *Forma*, Associate Editor of the *Journal of Applied Mechanics and* the *Journal of Biomechanical Engineering,* a member of the Editorial Board of the *Journal of Biomechanics, International Journal of Biomechanics and Modeling in Mechanobiology*, *Annals of Biomedical Engineering, and Mechanics Research Communications.*

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