



UNIVERSITY OF NOTRE DAME

AEROSPACE AND MECHANICAL ENGINEERING

SEMINAR ANNOUNCEMENT

- SPEAKER:** Robert L. Spilker, Sc.D.
Professor, Department of Biomedical Engineering
Rensselaer Polytechnic Institute
Troy, New York
- TOPIC:** The Role of Computational Bioengineering in Understanding Human Tissues
- DATE:** Tuesday, April 8, 2008
- TIME:** 3:30 p.m.
- PLACE:** 138 DeBartolo Hall

Abstract

Biomedical research and the understanding of human physiology rely on the integration of experimental and clinical studies, the results of which are interpreted through mathematical models. Due to the intrinsic complexity of physiology, the mathematical models, in turn, require computational methods for their solution. The true utility of an integrated experimental – theoretical – computational paradigm comes when the models have been thoroughly validated and then become predictive, that is, they are capable of accurately simulating some aspects of human physiology. The mathematical theories of biomechanics offer many examples of theory predicting physiological response in musculoskeletal and cardiopulmonary physiology (e.g., the deformation and stress in bone, the shear stress in arterial flows), but most physiological problems remain unsolved. This presentation considers one of the challenging, and as yet unsolved, biomechanical problems of the musculoskeletal system, namely the biomechanics of contact in human joints, and in particular, the role of computational bioengineering in constructing predictive models. We will examine mathematical models of soft tissues like cartilage, the state of the art in computational methods to solve these problems, our own methods for solving the tissue contact problems, and potential applications of the models in biomedical research and clinical practice.