The Department of Mechanical Engineering/College of Engineering and Applied Sciences

Stony Brook University

Mechanical Engineering Seminar

Faculty Candidate

Dr. Mariana Kersh

McKenzie Post-doctoral Research Fellow in the Department of Mechanical Engineering at the University of Melbourne

Lecture Title: It's all connected: relating structure, material, and function in musculoskeletal tissues

Monday, April 14, 2014 at 2PM, Room 173 Light Engineering Building

Abstract

Bone and joint diseases such as osteoporosis and osteoarthritis significantly impact the quality of life of those afflicted, and impose a personal and societal financial burden. Relating the structural and mechanical properties of musculoskeletal tissues to their function can help increase our understanding and therefore the treatment of bone and joint diseases. With this aim in mind, and using bone as a case study, this talk will (1) explore the assessment of bone structure in clinical-level medical images, (2) link bone architecture to functional outcomes using the finite-element method, and (3) evaluate the potential for exercise to combat bone loss using musculo-skeletal and finite-element models. This methodology has been developed as a top-down approach wherein macro-level tissue properties are evaluated with specific functional needs in mind, e.g. mitigating bone loss or restoring joint movement after orthopaedic surgeries, with minimal computational expense. Moreover, the combined roles of musculoskeletal tissues (bone, cartilage, ligaments) in joint function can eventually be understood and translated to the clinical realm to improve the treatment of musculoskeletal disorders.

Biography

Dr. Mariana Kersh is a McKenzie Post-doctoral Research Fellow in the Department of Mechanical Engineering at the University of Melbourne. Her research focuses on experimental methods to evaluate macro-level mechanical and structural properties of bone, cartilage, and connective tissues, in order to include them into finite element simulations of these tissues under physiological loads. She first received a Bachelor of Arts in English from The University of Texas-Austin, then obtained a Bachelors and Masters in Mechanical Engineering, and PhD from the interdisciplinary Materials Science Program at The University of Wisconsin – Madison (funded by NSF pre-doctoral fellowship). She received an Early Career Researcher Award (2013) from the Australia-New Zealand Orthopedic Research Society.

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