OrthoRaMS SEMINAR SERIES

Orthopaedic Research and Musculoskeletal Science

Thursday, November 14, 2024 1:00-2:00

Location: Dickson Conference Room, 3200 Thurston Bldg.

Mechanics and Computational Modeling Of Biological Tissues

Dr. Shadow Huang is an Associate Professor and Director of the MS Non-Thesis Program in the Mechanical and Aerospace Engineering Department at NC State University. She has diverse training in applied mechanics and computational simulation of various material systems. She was trained at the University of Pittsburgh (MS & PhD in Biomedical Engineering, Mechanical Engineering, and Materials Science). Before joining NC State, she was a Postdoctoral Associate at Massachusetts Institute of Technology. She was a 2023 Faculty Fellow of External Awards in the Office for Faculty Excellence and the Associate Director of the Analytical Instrumentation Facility from 2018 to 2021 at NC State University. Dr. Shadow Huang's research programs are centered on understanding the structure-property-function relations of biological materials. She has been recognized by the Presidential Early Career Award for Scientists and Engineers (PECASE, 2017) from the White House, the CAREER Award (2016) from the National Science Foundation, and the University Teacher Award (2020) for her teaching at NC State.

ABSTRACT

The mechanics of biological tissues, including both soft and hard tissues, is a multidisciplinary research area. There is a growing recognition that mathematical modeling plays a crucial role in understanding and predicting tissue growth and remodeling. These models can guide the identification and interpretation of insightful experiments and enable efficient exploration of the implications of various hypotheses. In my research group at NC State University, we employ a combination of experimental, microstructural, continuum mechanical, and computational methods to gain a deeper understanding of the relationships among tissue structure, properties, and functions. I will present examples from cardiovascular tissues, such as venous tissue, and musculoskeletal tissues, specifically tendon-bone insertion. The in-silico models we construct in this research are verified and refined by comparing them to our in-situ biaxial mechanical testing results, making them valuable translational tools for accurately predicting the material behavior of biological tissues.