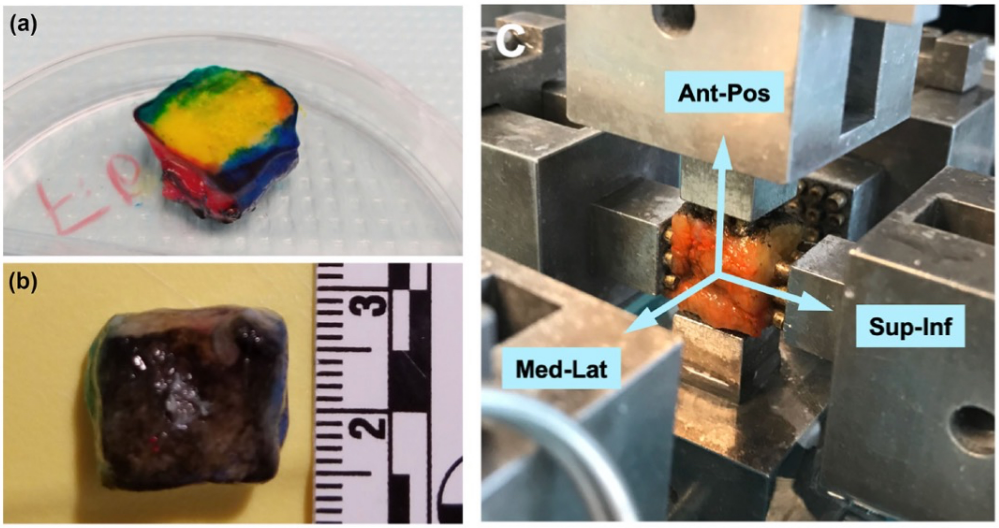
Graduate Research Assistantship
in
3D Experimental and Computational Breast Tissue Modeling

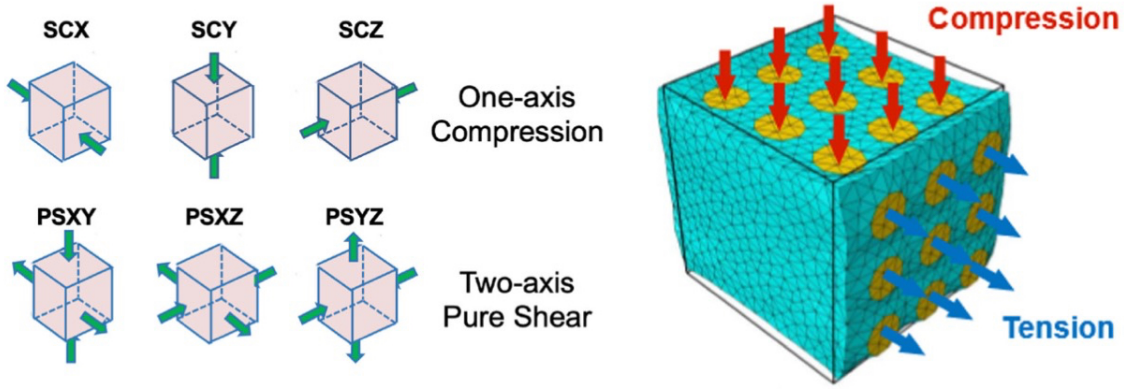
Michael S. Sacks

James T. Willerson Center for Cardiovascular Modeling and Simulation
Oden Institute for Computational Engineering Sciences ◇ Department of Biomedical Engineering

The University of Texas at Austin

Immediate opening





1. Description

The Willerson Center seeks a highly motivated Graduate Research Assistant in the area of 3D experimental and computational modeling of human breast tissue. As the human breast undergoes complex, large-scale, fully three dimensional deformations in vivo, three-dimensional (3D) characterization of its mechanical behavior is fundamental to its diagnosis, treatment, and surgical modifications. Its anisotropic, heterogeneous fibrous structure results in complex behavior at both the tissue and organ levels. Mathematically modeling of this complex anisotropic behavior is thus critical to the proper simulation of the human breast. Yet, current breast tissue constitutive models do not account for these complexities, so that there is a pressing need for more detailed fully 3D analysis.

This project will thus involve full 3D kinematic mechanical evaluation of human fibroglandular and adipose breast tissues, using our 3D kinematic numerical-experimental approach to acquire force-displacement data from both breast tissue subtypes. Constitutive model parameters will be determined using a detailed finite element model of the experimental setup coupled to nonlinear optimization. Computational approaches the finite element method (using FENICS) to solve material, tissue, and organ level problems. Machine learning methods are also being explored for this project.

Ideal applicants should have a strong interest in and a good background in experimental methods of soft tissue mechanics, as well as using Python and some exposure to the finite element method. Future studies will be required to link the observed anisotropy to the physical structure of the tissue, as well as mapping this heterogeneity and anisotropy across individuals.

2. GENERAL INFORMATION

Professor

Dr. Michael S. Sacks
W.A. "Tex" Moncrief, Jr. Simulation-Based Engineering and Sciences Chair
Director Willerson Center for Cardiovascular Modeling and Simulation
Professor of Biomedical Engineering

Office: Room 5.236 POB
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Phone: 512-272-7773

Time/Place

Most work will take place in the EER lab, 7th floor. You will have a desk and access to the state-of-the-art experimental biomechanics lab, as well as your own computer.

Dr. Sacks' Office hours: M,T,W,Th 4:30 pm-5:30 pm, Room 5.236 POB (in-person only).

Contact hours:

Group meetings and 1:1 during office hours.

PLEASE CONTACT DR. SACKS FOR FURTHER INFORMATION