THE UNIVERSITY OF ARIZONA
College of Engineering

Aerospace and Mechanical Engineering Seminar

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COVID-19 and the State of Lung Biomechanics Research

Abstract: Pulmonary disease, the leading cause of morbidity and mortality worldwide, is compounded by emerging threats, such as rising air pollution, vaping, and the infamous lung damaging COVID-19 pandemic. It is more pressing than ever to explore lung biomechanics and understand the impact of disease on structural material properties. Here we present recent advances to experimental capabilities aimed at informing computational techniques for pulmonary physiology and biomedical technology. We have constructed a novel volume-pressure apparatus for whole-lung ex-vivo inflation and deflation tests, capable of continuous measurements in both positive- and negative-pressure ventilation, all while accounting for air compressibility in real time; this system is uniquely paired with full-field, non-contact strain and displacement measurements to investigate tissue deformation heterogeneity. This fundamental study investigates the effect of bulk elasticity and breathing load distributions on localized material response. Findings directly inform computational analyses of pulmonary clinical imaging for understanding lung mechanics in-vivo, and further benefit considerations of multiscale computational analyses associating tissue sub-constituents to whole-organ response, understanding adaptation and remodeling in diseased states, and ventilation protocols for patient care.

Bio: Mona Eskandari is an Assistant Professor in the Department of Mechanical Engineering and associated faculty of the BREATHE Center in the School of Medicine at UC-Riverside. Prior to her postdoctoral fellowship at UC-Berkeley, she received her doctorate and master's degree from Stanford University, and her bachelor's degree from the University of Arizona, where she was also a Nugent medalist. She has been honored with several fellowships, including the University of California Provost's Engineering Faculty Research Fellowship and the National Science Foundation Graduate Research Fellowship. Her area of expertise is computational modeling and experimental characterization of biological systems, with an emphasis on pulmonary mechanics. Additionally, she is a recipient of the Early Engineering Educator Award from the American Society for Engineering Education for innovative teaching, and the prestigious K. Patricia Cross Future Leaders of Higher Education Award from the Association of American Colleges and Universities.

Thursday, April 15th at 4:00 P.M.
Zoom Link: https://arizona.zoom.us/j/84564071827 Passcode: 17502021