

Title: Modeling and Control for New Continuum Structures

Abstract: This talk will review modeling for some new compliant robotic structures. First, a new actuation concept - concentric precurved bellows - will be described and demonstrated, including simple constant curvature models, and some recent constant-curvature modeling discussions in the literature will be highlighted. Next, general kinetostatic problem formulations will be categorized and discussed. Recent work shows that model-based estimation of continuous load distributions along soft robots is feasible and useful. Finally, the talk will highlight real-time dynamic simulation work for all types of continuum and soft robots, including concentric-tube robot snap-through behavior.

Short Bio-Sketch: Caleb Rucker (Member, IEEE) received the B.S. degree in engineering mechanics and mathematics from Lipscomb University, Nashville, TN, USA, in 2006, and the Ph.D. degree in mechanical engineering from Vanderbilt University, Nashville, in 2011. He is currently an Associate Professor of mechanical engineering with The University of Tennessee, Knoxville, TN, USA, where he directs the Robotics, Engineering, and Continuum Mechanics in Healthcare Laboratory. Dr. Rucker was a recipient of the NSF CAREER Award in 2017, and he currently serves as an Associate Editor for the IEEE TRANSACTIONS ON ROBOTICS. His research interests include modeling, design, and control of soft and continuum robot structures.