UCLA Samueli School of Engineering

Mechanical & Aerospace Engineering Department Seminar

Monday February 13, 2023, 11 AM – 12 PM
ENG IV 38-138

Composites 2.0: Multiscale Computationally-driven Manufacturing

Marianna Maiaru
Associate Professor
Mechanical Engineering
UMass Lowell

ABSTRACT: The increasing demand for high-performance polymer-derived composites with improved stiffness-to-weight and strength-to-weight ratios requires significant research efforts for the implementation of multiscale computationally-driven design and manufacturing. Processing can lead to substantial residual stress build-up, which can compromise laminate strength and generate undesired residual deformations. Fortunately, cure-cycle parameters (cure temperature, hold times, ramp rates) can be optimized through computational process modeling techniques to reduce process-induced residual stresses. Advances in process modeling are crucial to Integrated Computational Materials Engineering (ICME), an emerging branch of mechanics intended to transform the design and manufacturing paradigm of advanced structures, and drastically reduce engineering time and cost through computationally-driven approaches. This talk will highlight multiscale process modeling techniques to understand the influence of processing parameters on polymer-derived composite performance in aerospace, automotive, and wind energy applications.

BIO: Marianna Maiaru (Associate Professor in Mechanical Engineering, UMass Lowell) is an expert in Integrated Computational Materials Engineering (ICME), virtual manufacturing and computational mechanics. She received her Ph.D. in Aerospace Engineering as a collaboration between Politecnico di Torino in Italy and the University of Michigan. Her research interests include composite structures, damage mechanics, multi-scale analysis, and higher-order finite elements and additive manufacturing. Maiaru has received numerous grants from NASA, NSF and the Air Force, including the AFOSR Young Investigator Program award in 2020 and the NSF CAREER award in 2022. She received the DEStech Young Researcher Award in 2021 and the AIAA ICME Prize in 2020 and 2022.

Host: Professor Taira ktaira@seas.ucla.edu