DEPARTMENT OF MECHANICAL ENGINEERING
WILLIAM MAXWELL REED SEMINAR SERIES

"Failure Analysis of Deployable Ultra-thin Ply Composite Shell Structures"

Armanj Hasanyan, Ph.D.
California Institute of Technology

Abstract: Coilable composite shell longerons are used to support large deployable spacecrafts for space structural applications. During stowage, the longerons undergo coiling around a rigid cylindrical hub. During this process, the composite longerons experiences localized buckling, which leads to local stress concentrations that may cause material failure. Currently, little is understood about the formation of the inner-flange buckle and the resulting failure mechanisms. To address these, coiling experiments of the longerons are conducted to observe the formation of the buckle and the resulting material failure. The buckle formation and stress concentration are observed using digital image correlation (DIC). X-ray μCT imaging is conducted to observe the influence of microstructural defects and their effects on the formation of cracks during coiling. The goal of this study is to understand the role of manufactured induced microstructural defects and their effects across different length-scales in causing failure in the composite shell longerons.

Bio: Dr. Armanj Hasanyan joined the Graduate Aerospace Laboratory at the California Institute of Technology (GALCIT) in 2018 as a postdoctoral researcher, working with Prof. Sergio Pellegrino. Currently, he is working on Caltech's Space Solar Power Project (SSPP). He is engaged in research on failure analysis of ultra-lightweight and flexible composite shells used in deployable structures, for space structural applications. He holds a Ph.D. and M.S. from the University of Michigan, Department of Aerospace Engineering, and a B.E. from Virginia Tech, Department of Engineering Science and Mechanics (ESM). His research in composite materials includes topics such as manufacturing, damage and fracture, stochastic mechanics, and creep and fatigue failure.

Date: Friday, Apr. 9th
Time: 1:00PM EST
Place: https://uky.zoom.us/j/92940732923
Contact: Dr. Alexandre Martin 257-4462

Attendance open to all interested persons

College of Engineering

DEPARTMENT OF MECHANICAL ENGINEERING
UNIVERSITY OF KENTUCKY
LEXINGTON, KENTUCKY