

DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

WILLIAM MAXWELL REED SEMINAR SERIES

“Influence of Microstructural Non-uniformity on Deformation of Virgin PICA Revealed by in-situ Micro-CT Experiments”

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Abstract:

The primary objective of thermal protection system (TPS) shields is to dissipate energy from the atmospheric interface during aerobraking maneuvers. Phenolic Impregnated Carbon Ablators (PICA) are a class of TPS ablaters that, during entry, sees significant recession and chemical decomposition by design. The phenolic resin absorbs energy during the pyrolysis decomposition, these gases are then transported out of the low-density material through the highly porous matrix, then the resulting charred material experiences oxidation and failure. The aerothermal loading the structure sees as leads to larger mechanical failure during interface flight. The characterization of non-isotropic failure modes of this distinctly complex structure remains a major factor in modelling limitations. This work begins to qualitatively and quantitatively characterize micro-scale structures and orientation-bias in compressive failure, and leveraging image processing and statistics to pull useful data out of traditionally difficult to process micro-CT volumetric material scans.

Speaker Bio:

Spencer Dansereau, final year PhD student at the University of Colorado Boulder, has spent the last decade in research & development of high temperature composites and ceramic additive manufacturing fields. Specializing in high-heat flux composites for hypersonic vehicles, his research has focus has been on the fabrication and testing of ceramic matrix composites and lightweight carbon ablaters. Educational background includes Mechanical Engineering and Literature Degrees from Montana State University, as well as Aerospace Engineering and Engineering Management graduate degrees from University of Colorado Boulder.

Date: Friday, September 13, 2024
Place: WT Young Library 1-62

Time: 3:00 PM EST
Contact: Dr. Jonathan Wenk

Attendance open to all interested persons