

DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

WILLIAM MAXWELL REED SEMINAR SERIES

“Multi-Physics Modeling of Ablative Processes”

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Abstract:

During atmospheric entry, spacecraft traveling at hypersonic speeds experience extreme aerothermodynamic environments requiring thermal protection systems (TPS) to ensure payload survival. In order to design TPS, predictive computational modeling is required and is traditionally carried out in an uncoupled manner, in which components of the physical modeling are assumed to be independent. However, for increasingly challenging problems in Entry, Descent, and Landing (EDL) these assumptions are not always valid, thereby motivating the development of a computational framework for multi-physics modeling. Ares, an API which couples the US3D flow solver with Icarus (material response solver) and Nero (radiation solver), is being developed with the intent of establishing a robust methodology for TPS design applications. This talk will highlight some of the EDL challenges which motivated the development of Ares and map them to specific model and algorithm implementation requirements, as well as design principles followed to sustain software growth.

Speaker Bio:

Olivia Schroeder is a research scientist employed by Analytical Mechanics Associates Inc., at the Aerothermodynamics branch NASA Ames. She received her BSc and MSc in Mechanical Engineering at the University of Kentucky and her PhD at the University of Minnesota. Her work focuses on multi-physics modeling of entry systems through the development of Ares, a coupling framework for predictive CFD, material response, and radiation solvers.

Date: Friday, March 8, 2024
Place: Whitehall Classroom Building 110

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

Attendance open to all interested persons