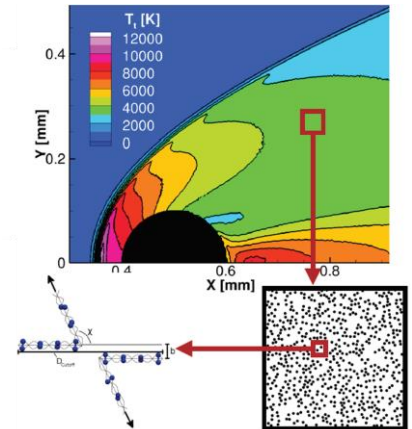




*American Institute of
Aeronautics and Astronautics
Dayton-Cincinnati Section*

**Lunch 'n' Learn
22 Mar 2024**

**First-Principles Simulations of
Thermochemical Nonequilibrium**
Guest Speaker: Dr. Ashley Verhoff
Air Force Research Laboratory



Abstract: Vehicles flying at high speeds can induce strong shock waves, resulting in flight environments rich in coupled flow phenomena, including thermal nonequilibrium, vibrational excitation, and dissociation. To gain molecular-level insight into the thermophysics that drive macroscopic fluid processes, we have incorporated ab initio potential energy surfaces in the Direct Molecular Simulation (DMS) method. In this unified framework, energy exchange, chemical reactions, transport, and fluid mechanics naturally arise from a single input. This has enabled us to derive transport properties and generate benchmark numerical solutions from first-principles, and leverage these results to evaluate and refine reduced order models of thermochemical nonequilibrium effects.

Biography: Dr. Ashley Verhoff is Chief of the Integrated Design and Analysis Section in the High-Speed Systems Division of the Air Force Research Laboratory (AFRL). She leads a team responsible for conceptual development, design, and analysis of high-speed platforms and assessment of their operational effectiveness. She earned her B.S. in Aerospace Engineering from the University of Cincinnati, and her M.S. and Ph.D. in the same from the University of Michigan. Prior to joining AFRL, Dr. Verhoff worked as an Aerospace Engineer at Blue Origin and as a Project Manager at Radiance Technologies. Dr. Verhoff is also a member of the AIAA Thermophysics Technical Committee.

Time: 11:45 am

Location:

*China Garden Buffet
112 Woodman Dr.
Dayton, OH 45431*

Lunch:

*You will be able to
purchase the buffet*

