



“PHYSICAL PHENOMENA ASSOCIATED WITH HYPERSONIC WEAPON VEHICLES”

Speaker: Dr. Phillip Ligrani

Eminent Scholar in Propulsion

Professor of UAH Mechanical & Aerospace Engineering

Numerous technical challenges are currently present which have vital influences on the performance, stability, delivery, reach of disruption and lethality, and strategic capabilities of hypersonic weapons. In the thermal-fluid sciences areas, related physical phenomena offer some of the most daunting challenges ever faced by scientists and engineers because of inter-related, coupled, and three-dimensional interactions between a plethora of simultaneous physical effects. These range from shock wave structure, unsteadiness, and boundary layer interactions, to laminar-turbulent transition, acoustic influences on laminar-turbulent transition, viscous and dissipative kinetic heating, heat transfer, thermal transport, thermal acoustic heat transfer, flow and thermal boundary conditions, wave induced heat flux, wave drag, rarefaction effects, surface slip phenomena, gas dissociation, and plasma sheaths. Within the presentation, discussion of these effects will be provided, with special focus on shock wave structure and influences, especially in relation to coupled and interacting hypersonic phenomena.



Dr. Phil Ligrani is currently the Eminent Scholar in Propulsion, and Professor of Mechanical and Aerospace Engineering at the University of Alabama in Huntsville. Previously, he was the Oliver L. Parks Endowed Chair, and Professor of Aerospace and Mechanical Engineering at Parks College of Saint Louis University. His prior academic position was as the Donald Schultz Professor of Turbomachinery in the Department of Engineering Science at the University of Oxford. There, from 2006 to 2009, he was also Director of Oxford University's Rolls-Royce UTC (University Technology Centre) in Heat Transfer and Aerodynamics. As of November 2019, Dr. Ligrani is author or co-author of more than 190 publications in archival journals, 9 book chapters, as well as approximately 138 conference publications and presentations. From 2010 to 2020, he presented or is scheduled to present 7 Invited Keynote Papers, 8 Invited Papers, and 7 Invited Plenary Keynote Papers at different international conferences. He has been primary advisor for a total of 98 graduate students completing Ph.D., M.E., M.S. degrees, and Turbomachinery Diplomas. Research interests include turbomachinery, convective heat transfer, and fluid mechanics, high-speed compressible flows, as well as micro-fluidics, fractionation, and measurement technologies.

There will also be short guided tours of our Johnson Research Center Laboratories at 1:30 p.m. following the luncheon.

