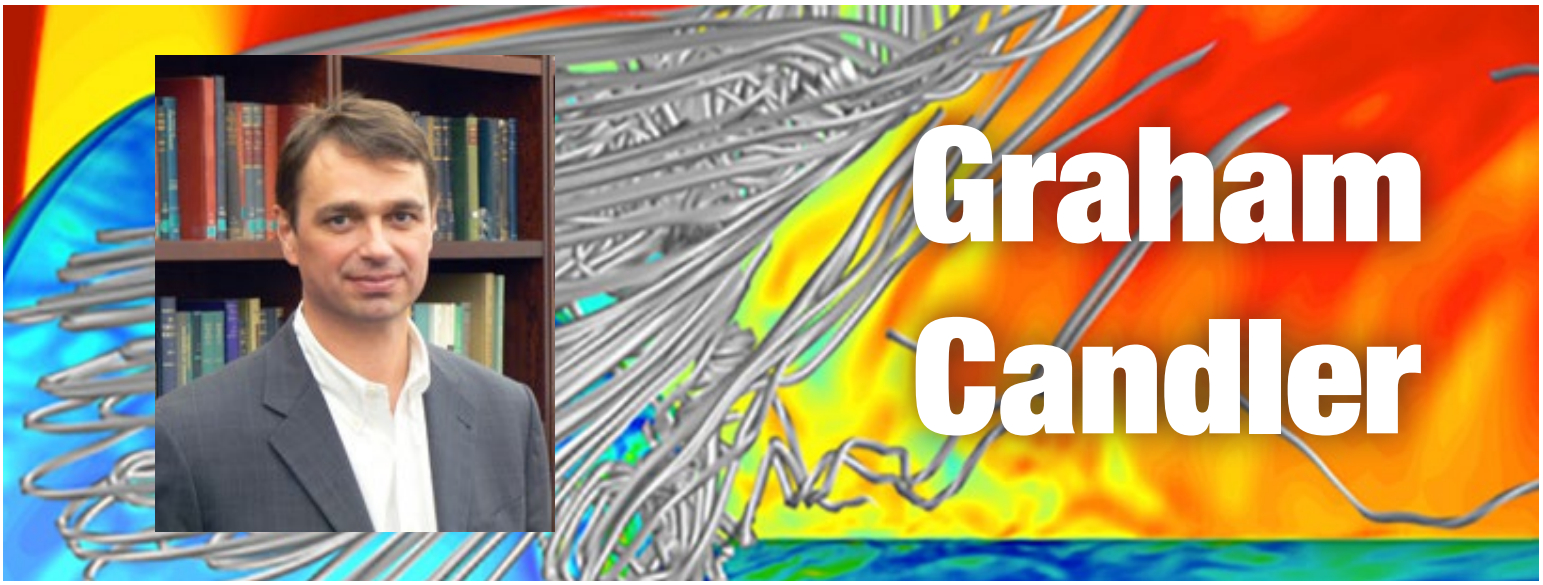
Aerospace Seminar



Professor, Aerospace Engineering & Mechanics - University of Minnesota

Advances in the Simulation of Hypersonic Flows

Friday, March 3, 2017 | ECCR 151 | 12:00 P.M.

Hypersonic flows are characterized by finite-rate chemical reactions, strong shock waves, gas-surface interactions, transition to turbulence, and ablative surfaces. These processes affect the flow dynamics, the aero-thermal loads, and the performance of the propulsion and control systems. As with conventional aircraft, aerodynamic performance is critical, but the main design driver for hypersonic systems is the protection of the vehicle from the high-temperature flow field and the management of the heat load on the vehicle.

The seminar will discuss recent advances in the high-fidelity simulation of hypersonic flows, with emphasis on improvements to gas-phase and gas-surface chemical kinetics models, mechanism-based laminar-to-turbulent transition prediction, and turbulent combustion modeling for scramjets. These simulations are being used to improve the understanding of complex hypersonic flow physics and to provide a validated predictive capability for the design of future hypersonic flight systems.