Mechanical & Aerospace Engineering

seminar

Treatment of Multi-Physics in Hypersonic Flows

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abstract

Sustained hypersonic flight has long eluded mankind due to the harsh operating environment and the current inability to develop a vehicle that can simultaneously survive the environment and achieve desired performance objectives. A central aspect of this is the presence of systemic multi-physics interactions between the fluid, thermal, structural, and material domains. The role of these interactions are not well understood, nor is the current state-of-the-art sufficient for simulating or observing them. This seminar will discuss these challenges, as well as on-going research activities seeking to overcome them.

biosketch

Jack McNamara is an associate professor in the Department of Mechanical & Aerospace Engineering at The Ohio State University; where he is the director of the Multi-Physics Interactions Research Group (MIRG \murj\) and the AFRL-University Collaborative Center in Structural Sciences. His research interests are broadly in the areas of fluid-structural interactions and model reduction of high-dimensional dynamical systems; with a synergistic focus on improving basic understanding and computational methods. A core application target is air vehicle operation in high-speed flow regimes, where there is a potential for complex interactions at both the component (e.g., fluid-thermal-structural-material) and vehicle (e.g., aero-servo-thermo-elastic-propulsive) levels. Other application areas include fluid-structural centric, multi-disciplinary interactions of wind turbines, flapping wing air vehicles, automobiles, and turbomachinery.

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