The AAE Fall 2010 Colloquium Series

The Helios Multi-Disciplinary Computational Platform for Rotorcraft Aeromechanics

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Ames Research Center
Moffett Field, CA

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3:00 P.M.
ARMS 1109

Abstract
The talk describes the design, development, validation and application of the Helios code, which is a multi-disciplinary computational platform for high-fidelity rotorcraft simulations. The main themes of the talk address the unique challenges facing rotorcraft aeromechanics, and how modern computational technology is being advanced to confront these challenges. Specifically, Helios utilizes a modular Python-based infrastructure that combines computational fluid dynamics, structural dynamics and vehicle flight dynamics codes within a single unified framework. At the heart of Helios is an innovative dual-mesh paradigm that combines unstructured meshes in the near-body region along with adaptive Cartesian meshes in the off-body region. The unstructured meshes permit ease of grid generation and accurate representation of high-Reynolds number boundary layers, while the adaptive Cartesian meshes enable high-order accurate resolution of tip vortices in the rotor wake. Computational results demonstrate that this approach provides significant advantages for pushing the state-of-the-art of high-fidelity simulations in general and rotorcraft simulations in particular. The talk also discusses how the maturation of computational technology is leading to a new era of production-oriented computational tools development and provides thoughts on the opportunities for doing fundamental research within such an environment.

Speaker Bio: Dr. Sankaran is the architect and technical lead of the Helios code development program funded by the Department of Defense’s CREATE program through the High Performance Computing Modernization Office and located at US Army’s Aero-Flight Dynamics Directorate in Ames Research Center, Moffett Field, CA. Prior to this, Dr. Sankaran has spent over two decades in academia, NASA and the DoD developing innovative CFD algorithms and codes. He has also been instrumental in applying CFD to a variety of problems in liquid rocket combustion, electric propulsion, rotorcraft aeromechanics and hydrodynamics. He is particularly delighted to visit Purdue University where he served as research faculty between 2003 and 2006.

An informal coffee & cookie reception will be held prior to the lecture at 2:30 p.m.,
ARMS 3119 Conference Room