PURDUE UNIVERSITY

School of Aeronautics and Astronautics

The AAE Fall 2009 Colloquium Series

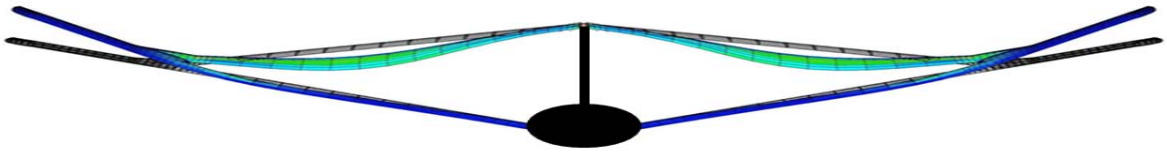
COLLOQUIUM

Practical Aeroelastic System Optimization in the face of Non-Linear Reality

Max Blair, PhD Purdue 1989
Air Force Research Laboratory
Air Vehicles Directorate

THURSDAY, DECEMBER 10, 2009
3:00 p.m.
ARMS 1109

Aeroelastic systems are complex and aeroelastic design optimization demands accountability for every variable, every metric, and every constraint. Achieving the best aeroelastic design requires the complexity to be accurately contained. Simple geometric models are scalable in complexity. For instance, intrinsic beam theory is scalable to high fidelity solid finite elements.



Examples of aeroelastic system design research of interest to the U.S. Air Force are Flapping Micro Air Vehicles (MAV), High-Altitude Long-Endurance (HALE) vehicles and Long Range Supersonic vehicles. A competitive design of any of these systems must involve an optimized mix of non-linear structural and non-linear aerodynamic analysis.

The joined-wing SensorCraft variant is a transonic high-flyer with geometric non-linear structural mechanics. The joined-wing has provided an opportunity to develop aeroelastic design optimization with new and unexplored physics. The model development starts with simple geometric forms. Dr Blair will introduce SCOOT, the most practical approach in developing machine accurate geometric sensitivities.

Dr. Max Blair is a research aerospace engineer in the Air Force Research Laboratory and applies his talents in the MultiDisciplinary Science & Technology Center (MSTC). He has focused his general knowledge of aeroelastic systems on development of the AFRL SensorCraft, a concept HALE system for surveillance.

An informal coffee & cookie reception will be held prior to the lecture at 2:30 p.m. in the AAE/ARMS undergraduate lounge (directly in front of ARMS 3rd floor elevators)

SCOOT