



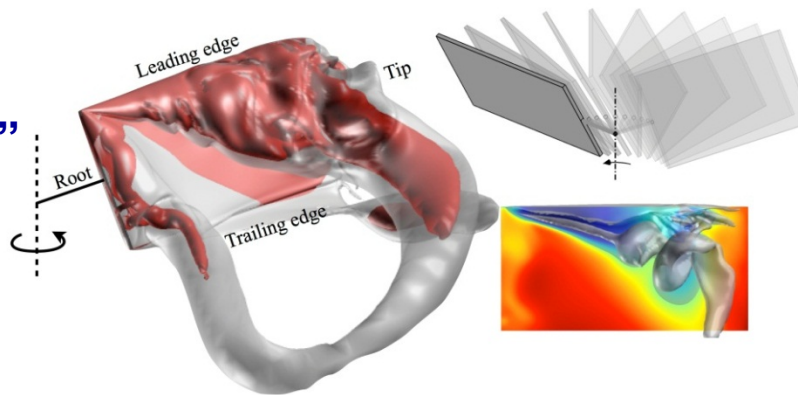
*American Institute of  
Aeronautics and Astronautics  
Dayton-Cincinnati Section*

**Lunch 'n' Learn  
Friday 22 Nov 2013**

## **“Flapping Wing Dynamics”**

**Guest Speaker:**

**Dr. Daniel Garmann**  
**AFRL**



Flapping wing aerodynamics has been the focus of much research over the last decade. The idea of small, autonomous aircraft to perch, hover, or move inconspicuously through virtually any environment has brought vast new possibilities to the areas of intelligence, surveillance, and reconnaissance. Along with these new possibilities, however, come many challenges in order to understand and mimic biological flight of birds and insects. The purpose of this seminar is to present an overview of flapping wing dynamics through several high-fidelity computational studies which have provided valuable insight into the three-dimensional flow structure and unsteady loading induced by a revolving wing in quiescent fluid. Large eddy simulations (LES) of these flows have allowed close examination of leading edge vortex (LEV) attachment, breakdown, and shear layer instabilities, force augmentation or saturation with Reynolds number and wing aspect ratio, and wake capture effects for reciprocating motions. Each of these aspects will all be highlighted during the talk through several animations and visualizations of the unsteady flow structure.

Dr. Dan Garmann recently completed his PhD in Aerospace Engineering from the University of Cincinnati and began a post-doctoral position at the Air Force Research Laboratory (AFRL) as a research associate with the Ohio Aerospace Institute. Prior to earning his PhD, Dr. Garmann had worked at AFRL as an undergraduate and graduate co-op for a number of years in the Computational Sciences Center of Excellence of the Aerospace Systems Directorate, focusing on high-fidelity simulation of low-Reynolds number flows. Notably, Dan was recently awarded the 2013 AIAA Best Paper Award in Fluid Dynamics.

**Time: 11:45 am**

**Location:**

**China Garden Buffet**  
**112 Woodman Dr.**  
**Dayton, OH 45431**

**Lunch:**

**You will be able to  
purchase the buffet**

