



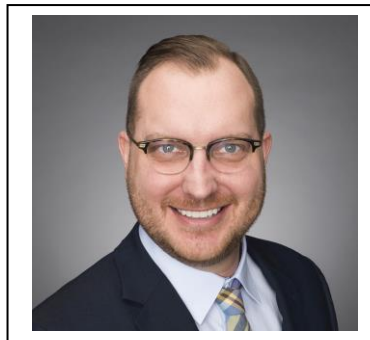
American Institute of  
Aeronautics and Astronautics  
Dayton-Cincinnati Section

## Lunch 'n' Learn

**Economical and Accurate Aerodynamic  
Database Generation using System  
Identification**

***Guest Speaker:***  
***Dr. Tim Eymann***

**Friday 31 May 2019; 11:45 AM**



**Abstract:** Aerodynamic databases enable the exploration of system performance by capturing critical attributes of a vehicle in a form that can be used by other tools that require faster than real time prediction of a system's flight characteristics. Traditionally, these databases were built up through a large wind-tunnel campaign with a test matrix spanning sweeps of parameters such as angle-of-attack, Mach number, and control surface deflections. For decades, computational fluid dynamics (CFD) simulations have been supplementing these wind tunnel runs. These CFD simulations are usually set up as a direct analogue of the test set-up, which usually means simulating fixed components and limiting any vehicle motion to that which the tunnel can reproduce. This talk will explore how system identification (SID) techniques can be used to take advantage of CFD's unique capabilities to dynamically simulate an aerospace system in a way not possible with physical testing. We will also discuss how SID has the ability to dramatically reduce the number of CFD simulations required to generate an aerodynamic database, without sacrificing the physical fidelity of the simulations.

**Biography:** Dr. Timothy Eymann is an Aerospace Engineer in the High Speed Systems Division of the Air Force Research Laboratory, Aerospace Systems Directorate. As part of the HPCMP CREATE™-AV Kestrel software development team, he leads development projects for Kestrel's off-body Cartesian solver, SAMAir, and directs Kestrel's hypersonic validation and verification efforts. He earned his Ph.D. in Aerospace Engineering and Scientific Computing from the University of Michigan in 2013, a masters in Aerospace Engineering from the Georgia Institute of Technology in 2006, and a B.S. in Mechanical Engineering from the University of Missouri in 2003. Prior to joining AFRL, Dr. Eymann worked as a Kestrel developer in the 96<sup>th</sup> Range Group at Eglin AFB and performed store separation CFD simulations as a member of the Air Force SEEK EAGLE office. Dr. Eymann is an AIAA Senior Member and is currently the Secretary-Treasurer of the AIAA Fluid Dynamics Technical Committee.

### **Location**

**China Garden Buffett  
Airway Center  
112 Woodman Drive  
Dayton OH 45432**

### **Lunch**

**Buffett style, all-you-can-eat Asian cuisine.  
Available for purchase.**

