UNIVERSITY OF CENTRAL FLORIDA

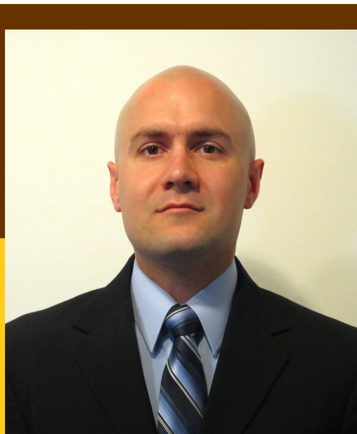
MECHANICAL AND AEROSPACE ENGINEERING

# Announcing MAE Spring 2013 Seminar Series

## Friday, January 25, 2013, 2:00pm-3:00pm, CL 1, Room 320

This event is hosted by the College of Engineering and Computer Science and the Mechanical and Aerospace Engineering Department at the University of Central Florida

# "A Semi-Active Approach to Turbomachinery Blade Vibration Reduction"




**Jeffrey L. Kauffman, Ph.D.**

**Aerospace Engineering**

**Pennsylvania State University**



**Abstract -** Adaptive structures create unique engineering opportunities by using integrated sensors and actuators to respond to environmental stimuli. A few of the many applications include morphing airfoils, vibration energy harvesting, and deployable spacecraft structures. Prof. Kauffman will focus on the development, simulation, and experimental demonstration of a vibration reduction approach termed resonance frequency detuning. This semi-active technique is uniquely situated to alleviate unwanted vibration of turbomachinery blades, thus reducing the dangers of high-cycle fatigue while also decreasing the blade weight. Detuning applies to any structure that is subjected to frequency-sweep excitation and involves altering the structural properties to avoid (to the extent possible) resonance excitation and inhibit large vibration response. In this application, piezoelectric material on a turbomachinery blade creates a continuum of available structural stiffness states. Optimal control of the material's electrical boundary conditions then enables this approach to detune the structural resonance frequency from that of the excitation.


**Bio -** Prof. Kauffman conducts broad research in the areas of structural dynamics and adaptive structures. He is particularly interested in multifunctional and energy efficient structures with applications to vibration reduction, energy harvesting, and structural morphing. Ongoing research includes a self-powered, autonomous implementation of resonance frequency detuning, the inclusion and exploitation of nonlinear dynamics for enhanced energy harvesting, and novel viscous damping models for spacecraft cable wiring harnesses. Prof. Kauffman received M.S. and Ph.D. degrees in Aerospace Engineering from the Pennsylvania State University while researching piezoelectric-based vibration energy harvesting and turbomachinery blade vibration reduction, respectively. He also received a B.S. degree from the California Institute of Technology in Engineering & Applied Science with a concentration in Aeronautics.

**Date:**
**Friday, 01/25/2013**

**Time:**
**2:00pm—3:00pm**

**Location:**
**CL 1, Room 320**

**For more information please contact:**

**Dr. Tina Tian at Tian.Tian@ucf.edu**

**www.mae.ucf.edu**