

Seminar Talk

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Tuesday, February 21, 2017

3:00 p.m. KH 224

Title: Applications of Smart Materials in Coupled Systems

Abstract:

Shape adaptation is a trait that some smart-materials naturally exhibit; hence, such materials may offer system-level benefits as actuators for morphing, sensors and energy harvesters while simultaneously improving robustness by reducing the part count and mechanical complexity. This presentation will review recent progress made towards enabling various “solid-state” designs in systems that are conventionally complex. Particularly, research in shape morphing of aerodynamic surfaces including static and dynamic camber, thickness and planform control, leading to the flight testing of two small aircraft will be presented. In the applications that will be discussed, coupled analysis of fluid-structure interaction and novel morphing concepts have been employed, and piezoelectric composite actuators were utilized.

Bio:

Dr. Bilgen received his B.S., M.S. and Ph.D. degrees in Mechanical Engineering from Virginia Tech in 2005, 2007 and 2010 respectively, and currently is a tenure-track faculty at the Mechanical and Aerospace Engineering Department of Old Dominion University in Norfolk, Virginia. His technical expertise is in the areas of design, modeling, optimization and experimental characterization of multi-functional, adaptive and composite smart-material structures, morphing aerodynamic surfaces, and small Unmanned Aircraft Systems (UAS). Dr. Bilgen’s research to date in the field of adaptive/active structures, composites and small UAS incorporating smart-materials has led to two book chapters, 29 peer-reviewed journal articles and 52 conference papers, including the ASME / BOEING Best Paper Award at the AIAA SDM 2007 conference, a third place in the BOEING Engineering Student of the Year 2010 Award and an invited plenary session talk at the 5th ECCOMAS Thematic Conference on Smart Structures and Materials. In 2013, Dr. Bilgen was selected as the Most Inspirational Faculty Member of the Batten College of Engineering and Technology at Old Dominion University, nominated by the M.E. student graduating with the highest GPA.