

The Department of Mechanical Engineering presents:

# Dr. Gregory Paul Carman

Professor

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**11:10AM-12:00PM**  
**Bourns Hall A265**

## Heterogeneous Laminate Magnetolectrics: Analysis, Fabrication, and Testing

**Abstract:** This presentation briefly describes the analysis, fabrication and testing conducted on several heterogeneous layered magnetolectric systems (i.e. piezoelectric with magnetostrictive) being investigated at UCLA. Layered magnetolectrics represent a new class of materials capable of converting energy between electrical to magnetic states using mechanical transduction. Applications for these novel systems include magnetometers, memory devices, and EM waveguides. The UCLA modeling efforts focuses on understanding the discrepancies between analytical predictions and experimental results, something we found attributable to demagnetization effects and mechanical shear lag rather than interface effects as suggested in the literature. Experimental results also show equivalence between the direct and converse magnetolectric effects. Tests conducted on thin film systems containing single domain structures confirm of electro-magnetic coupling in the small scale.

**Biography:** Professor Carman heads up the Active Materials Lab in the Mechanical and Aerospace Engineering Department at UCLA. He was chairman for the Adaptive Structures and Material Systems of the ASME (2000-2002), holds a position as Associate editor for the *Journal of Intelligent Material Systems Structures*, and *Smart Materials and Structures* and is on the editorial advisory board of *Journal of Composite Materials*. He was awarded the Northrop Grumman Young Faculty in 1995 for his research work at UCLA on active materials and three best paper awards from the American Society of Mechanical Engineering Adaptive Structures and Material Systems committee in 1996, 2001 and in 2007. In 2002 he was made honorary professor of the University of Baotou China and elected to the grade of Fellow in ASME in 2003. Professor Carman was awarded the ASME Adaptive Structures and Material Systems Prize honoring his contributions to smart materials and structures and life long commitment to this field in 2004. Professor Carman is mainly interested in the basic mechanics, materials, and biological issues related to a wide variety of coupled electro-magneto-thermo-mechanical materials.

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