PURDUE UNIVERSITY

School of Aeronautics and Astronautics

The AAE Fall 2012 Colloquium Series

COLLOQUIUM

Identification of Microstructure-Properties-Behavior Relations in Advanced Materials Using Novel Nondestructive Testing Approaches

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Abstract

The prevailing materials-by-design concept for advanced applications in energy, automotive, aerospace and mechanical industries greatly depends on our ability to identify and quantify critical relationships between reversible/irreversible microstructural changes and deformation/damage mechanisms. In this direction, remarkable progress has been achieved by using in situ/ex situ characterization equipment in combination with mechanical testing devices. This talk presents an overview of a novel characterization approach developed to investigate microstructure-dependent initiation and evolution of deformation mechanisms in metal alloys. The approach is based on information harvested in situ by an innovative nondestructive monitoring strategy combined with mechanical testing. Targeted observations of changes caused by grain-scale deformation patterns are quantified by obtaining grain resolved full-field surface strain measurements using digital image correlation and recording volume-related activity by continuous acoustic emission. Extensions of the presented approach for the identification of damage precursors, as well as the use of computational microstructure-sensitive modeling are also presented.

Bio

Antonios Kontsos joined the Mechanical Engineering & Mechanics Department at Drexel University in September 2009 and he is currently the Director of the Theoretical and Applied Mechanics Group (TAMG). He received his undergraduate 5-year Diploma (2002) from the Department of Mechanical Engineering & Aeronautics at University of Patras (Greece), and his M.S (2005) and Ph.D. (2007) degrees from the Department of Mechanical Engineering & Materials Science at Rice University (Houston, TX). He also held a 2-year Post-doc position at the Center for Mechanics of Solids, Structures and Materials in the Aerospace Engineering & Engineering Mechanics Department at the University of Texas at Austin (Austin, TX). Dr. Kontsos is a member of the ASME, TMS, ASNT and Sigma Xi societies and he is serving as the Faculty Advisor of the ASME and Pi Tau Sigma chapters at Drexel University.

An informal coffee & cookie reception will be held prior to the lecture at 2:30 p.m. in the AAE/ARMS undergraduate lounge (directly in front of ARMS 3rd floor elevators).