Department of Structural Engineering
University of California, San Diego
SE 290 Seminar

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"Optimization Problems in Inverse Identification of Delamination in Laminated Composites Using Electrical Resistance Tomography"

Wednesday, May 3, 2017
1:00 pm - 1:50 pm, Pepper Canyon Hall, Room 122

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Abstract

The imaging technique that uses electrical properties of materials such as electrical resistance measured on the surface/boundary to image subsurface details is called Electrical Resistance Tomography (ERT). Over the last decade or more, ERT techniques have been investigated for applications in subsurface imaging of soils in geotechnical engineering, biomedical imaging of pulmonary edema of lungs and flows in arteries/veins, and for damage quantification for structural health monitoring. Our interest is to develop ERT as a technique as a non-intrusive imaging and damage sensing technique for accurate quantification of damage initiation and growth in lab experiments for composite progressive failure. The talk presents two optimization challenges addressed in our work to apply ERT to carbon fiber reinforced polymer composites-, namely optimization for inverse identification and optimization for sensor selection. The identification of damage in composites using surface measured electrical properties requires the solution of an inverse problem that is computationally expensive. Our work investigated use of different surrogate modeling techniques to address the computational challenges in the inverse optimization. In addition, hardware limitations often limit the number of electrode pairs

that can be used for the sensing. Our research has developed a novel approach developed for optimal sensor selection for ERT.

Biography

Dr. Satchi Venkataraman is currently Professor of Aerospace Engineering at San Diego State University (SDSU). Dr. Venkataraman earned his PhD in Engineering Mechanics from University of Florida, Master's degree in Mechanical Engineering from Clemson University and Bachelor's degree in Mechanical Engineering from Anna University, Chennai, India. He worked as a research engineer for Aerochem Corporation from 2000-2002 until he joined SDSU in 2002. His areas of interest and expertise are in Analysis and Design of Composite Aerospace Structures, Structural Optimization, Uncertainty Quantification, and Reliability Based Design.

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Sponsored by Professor Kenneth Loh
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