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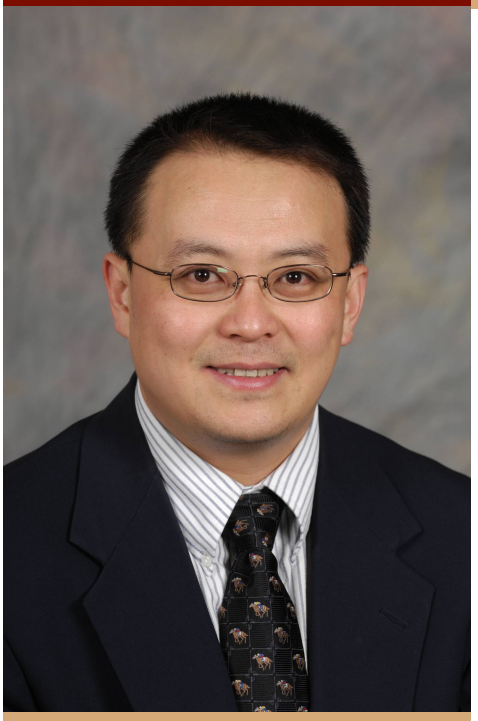
Damage identification and health monitoring of composite structures



Abstract: Structural health monitoring (SHM) is one of the important tools to maintain the safety and integrity of structures, such as aerospace, automotive, machinery and civil structures. A reliable nondestructive damage identification and assessment is essential for the development of such monitoring systems, since undetected or untreated damage may grow and lead to structural failure. The anisotropy of composites and the fact that much of damage in composites occurs beneath the surface of laminates increase the complexity of damage assessment in composite structures. This study focuses on developing the relationship between the dynamic response and the damage as a basis of the damage identification method for composite structures. In particular, two recently developed algorithms (i.e., 2-D continuous wavelet transform (CWT) based method and a strain energy-based damage severity correction factor (DSCF) method) for damage identification of plate-type structures are presented, and their implementation to numerical and experimental modal data is emphasized. It shows that 2-D CWT is effective to indicate the location and area of damage; while DSCF is capable of not only effectively indicating the location of damage but also approximating the relative damage severity in a plate-type composite structure.

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Biography: Professor Pizhong Qiao received his Ph.D. in Civil Engineering from West Virginia University (WVU) in 1997. Before joining WSU, Dr. Qiao was Assistant/Associate Professor of Civil Engineering at the University of Akron, Ohio from 1999 to 2006 and Research Assistant Professor of Civil and Environmental Engineering at WVU from 1997 to 1999. He is a registered professional engineer (PE) in Structural Engineering and certified in the practice of structural engineering from Structural Engineering Certification Board (SECB). He was named a Fellow of the American Society of Civil Engineers (ASCE) in April 2007. He is *one of highly cited scientist*s (about top 1%) in the field of engineering according to Essential Science Indicators (ESI). Dr. Qiao has been extensively working in development, research and application of advanced and high performance materials (smart materials, polymer composites, and sustainable concrete) in civil and aerospace engineering. His research interest includes Analytical and Applied Mechanics, Smart and Composite Materials, Interface Mechanics and Fracture, Impact Mechanics and High Energy Absorption Materials, Structural Health Monitoring, Integrated Intelligent Structural Systems, Materials Characterization, and Sustainable Concrete. Most recently, he received the Anjan Bose Outstanding Researcher Award, the highest research award in the College of Engineering and Architecture at WSU.