

Overview of NDE Activities at Michigan State University

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Nondestructive Evaluation is an integral part of manufacturing and maintenance of structures and parts. This talk will describe an overview of the research activities in Nondestructive Evaluation Laboratory at Michigan State University. The group works on Electromagnetic (zero frequency to microwave frequency), Ultrasonic and X-ray NDE methods for a variety of applications ranging from inspection of nuclear fuel pellets and buried gas transmission pipelines to detection of cracks in implanted prosthetic heart valves. The research activities can be broad classified into 3 categories, namely, i) development of computational models for the solution of forward problems, ii) solution of inverse problems and iii) development of sensors & systems.

Highlights of some of the ongoing projects related to nuclear and aviation industries will also be presented.

Biography: Lalita Udpa received her Ph.D. in Electrical Engineering in 1986 and is currently a Professor in the department of Electrical and Computer Engineering at Michigan State University. Dr. Udpa works primarily in the broad areas of Nondestructive Evaluation, Signal Processing and biomedical applications. She has over 20 years' experience working on various aspects of NDE such as development of computational models for the forward problem in NDE, signal and image processing, pattern recognition and neural networks, and development of solution techniques for inverse problems. Dr. Udpa has graduated 25 PhD and 40 MS students. She has authored or coauthored over 250 scholarly publications and is an associate technical editor of the American Society of Nondestructive Testing Journal - Materials Evaluation and is on the Editorial Board of Research Techniques in NDE. Dr. Udpa is a Fellow of the IEEE and a Fellow of the American Society of Nondestructive Testing, Fellow of the Indian Society of Nondestructive Testing and a Member of the Academie, NDT International.

Overview of CFD Activities at Michigan State University

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The computational fluid dynamics research team at Michigan State University are involved in modeling and simulation of complex fluid flows in various engineering systems which includes: (1) unsteady turbulent reacting flows in high speed propulsion systems and internal combustion engines, (2) multiphase turbulent flows such as sprays, (3) two-fluid turbulent flows such as oil-water mixture, and (4) unsteady flows over stationary and moving aerodynamic objects. Dr. Jaber and his team at MSU are currently working on a new class of high fidelity models based on the large eddy simulation (LES) concept that can capture turbulence, multiphase transport, mixing and chemical reacting in low and high-speed flows. These simulations are conducted with highly efficient and accurate numerical algorithms on high performance parallel computers at MSU and elsewhere for conditions similar to those seen in the laboratory experiments.

Biography: Farhad Jaber is a Professor of Mechanical Engineering and the Director of Computational Fluid Dynamic Laboratory at Michigan State University. He received his Ph.D. in Mechanical Engineering from the State University of New York at Buffalo, in 1996. Dr. Jaber's research focuses on the computational fluid dynamics, turbulent mixing and reaction, large scale and high performance computations, statistical modeling, multiphase transport and propulsion. He is a recipient of US Office of Naval Research's YIP award, US National Science Foundation's CAREER award, and Michigan State University's Distinguished Scholar Withrow award.