Dr. Jennifer E. Michaels is a Professor in the School of Electrical and Computer Engineering at Georgia Tech and is Interim Associate Chair of ECE Undergraduate Affairs. She received the Bachelor’s of Electrical Engineering degree from Georgia Tech in 1976, and began working in the field of ultrasonic nondestructive evaluation at the Hanford Engineering Development Laboratory in Richland, Washington. This work led to her graduate studies in Theoretical and Applied Mechanics at Cornell University, where she earned her M.S. and Ph.D. degrees in 1982 and 1984, respectively, and then spent a year as an IBM Postdoctoral Fellow. From 1985 until joining Georgia Tech in 2002, she worked in industry, first as co-founder of a startup company, and later as Manager of Systems Development at Panametrics, Inc., a world leader in the development, fabrication and deployment of custom automated ultrasonic inspection systems. At Georgia Tech she is co-director of the QUEST (Quantitative Ultrasonic Evaluation, Sensing and Testing) Laboratory where current projects relate to ultrasonic structural health monitoring and nondestructive evaluation.

Professor Michaels is a member of the Acoustical Society of America and the American Society of Nondestructive Testing, a senior member of IEEE, and an Associate Editor of the IEEE Transactions on Instrumentation and Measurement. Her general research interests include signal processing, wave propagation, pattern recognition, detection and estimation, data fusion, sensing methods and measurement systems. Current and past sponsors of her work include AFRL, AFOSR, DARPA, HSARPA, NSF and industry.

Signal Processing and Imaging with Ultrasonic Guided Waves: Application to Structural Health Monitoring

Ultrasonic guided waves have the potential to interrogate large areas of structures for damage, and many researchers are actively considering them for in situ monitoring of critical structures that support such waves. Unlike conventional nondestructive evaluation (NDE) techniques, where sensors interrogating a small region are manually moved or automatically scanned to obtain complete spatial coverage, in situ sensors for structural health monitoring (SHM) are fixed in space. However, the constraints of spatially fixed transducers can severely limit the performance of such a guided wave SHM system, particularly when the structure is subjected to variable operational and environmental conditions. This presentation motivates an approach to guided wave SHM using a spatially distributed array of discrete transducers, and describes the signal processing and imaging methods developed for detecting, locating and characterizing damage. Recent results are presented from current and past projects of the QUEST Laboratory at Georgia Tech.