UNCLASSIFIED

Information Science and Technology Seminar Speaker Series

Douglas Allaire
Texas A&M University

A Composition-based Approach to Uncertainty Quantification with Connections to Multi-information Source Optimization

Wednesday, April 16, 2014

3:00 - 4:00 PM

TA-3, Bldg. 1690, Room 102 (CNLS Conference Room)

Abstract: To support effective decision making, engineers and scientists must comprehend and manage various uncertainties throughout analysis and design processes. Unfortunately, in today's modern systems, uncertainty analysis can become cumbersome and computationally intractable for one individual or group to manage. This is particularly true for systems comprised of a large number of components, subsystems, or disciplines. In many cases, these components may be developed by different groups and even run on different computational platforms. In this talk we propose an approach for synthesizing uncertainty analysis tasks performed independently using the various information-sources used to model the components of a feed-forward system. Our proposed composition-based uncertainty analysis approach is shown to be provably convergent in distribution under certain conditions. The proposed method is illustrated on the quantification of uncertainty for a multidisciplinary gas turbine system and is compared to a traditional system-level Monte Carlo uncertainty analysis approach.

Biography: Douglas Allaire is an Assistant Professor in the Department of Mechanical Engineering at Texas A&M University. He holds SB, SM, and Ph.D. degrees from the Department of Aeronautics and Astronautics at MIT. His current research focuses on the development of computational methods for the analysis, design, and operation of complex systems. He is specifically interested in aspects of uncertainty quantification, multidisciplinary design optimization, and compositional methods for simulation-based design. He is currently working on projects involving the development of computational methods for enabling self-aware unmanned aerial vehicles, the development of optimal algorithms for multi-information source management in design, and the development of methods for enabling correct-by-construction model-based design processes.

For more information contact the technical host Frank Alexander, fja@lanl.gov, 665-4518. If you wish to make an appointment to meet with Allaire please contact Josephine Olivas, jojo@lanl.gov, 663-5725.

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