

## Uncertainty Quantification for Reliability Analysis and Decision Making in Engineering Systems



### **Prof. S. Mahadevan**

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This talk will discuss current research on uncertainty quantification for reliability assessment and decision-making in engineering systems. Model-based simulation is attractive for the reliability analysis of systems that are too large and complex for full-scale testing. However, model-based simulation involves many approximations and assumptions, and thus confidence in the simulation result is an important consideration in risk-informed decision-making. Sources of uncertainty are both aleatory and epistemic, stemming from natural variability, information uncertainty, and modeling approximations. The presentation will draw on ongoing research projects in civil, mechanical and aerospace engineering to discuss (1) the effects of data uncertainty and model uncertainty (both due to model form assumptions and solution approximations) on reliability assessment of multi-physics, multi-scale systems; (2) Bayesian networks for integrating heterogeneous information from multiple sources (models, tests, experts) in multiple formats; and (3) decision support for risk management throughout the life cycle of engineered systems..

Professor Sankaran Mahadevan has more than twenty-five years of research and teaching experience in reliability and risk analysis, design optimization, structural health monitoring, model verification and validation, and uncertainty quantification. His research has been extensively funded by NSF, NASA, FAA, DOE, DOD, DOT, NIST, General Motors, Chrysler, Union Pacific, American Railroad Association, and Sandia, Idaho, Los Alamos and Oak Ridge National Laboratories. His research contributions are documented in more than 450 publications, including two textbooks on reliability methods and 200 journal papers. He has directed 40 Ph.D. dissertations and 24 M. S. theses, and has taught many industry short courses on reliability and risk analysis methods. His awards include the NASA Next Generation Design Tools award (NASA), the SAE Distinguished Probabilistic Methods Educator Award, and best paper awards in the MORS Journal and the SDM and IMAC conferences.

Professor Mahadevan obtained his B.S. from Indian Institute of Technology, Kanpur, M.S. from Rensselaer Polytechnic Institute, Troy, NY, and Ph.D. from Georgia Institute of Technology, Atlanta, GA.

**Thursday, November 12, 2015, 12:00-1:15pm**  
**JHU Homewood Campus, Hackerman Hall B-17**

Seminar is **FREE and open to the public**. Attendance is required for all enrolled Civil Engineering graduate students. For parking please see link for visitors at [www.jhu.edu](http://www.jhu.edu) & select information on Homewood Campus. For CISMMS information, visit <http://cismms.jhu.edu>