

# DEPARTMENT OF MECHANICAL ENGINEERING

## SEMINAR SERIES



### Multifidelity Modeling for Design, Optimization and Uncertainty Quantification

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**Abstract:** Multifidelity modeling refers to the situation where we have available several numerical models that describe a system of interest. These numerical models may vary in "fidelity" or "skill", encompassing different resolutions, different physics, and different modeling assumptions; they may also include surrogates such as reduced-order models. A multifidelity approach seeks to exploit optimally all available models and data, using cheap models where possible but maintaining the quality of higher-fidelity information and associated guarantees of convergence. This talk discusses the key elements of multifidelity modeling: constructing reduced-order models, quantifying model uncertainties, selecting models with appropriate fidelity for the task at hand, and synthesizing multifidelity information. We highlight recent progress in developing reduced models for systems with many parameters and demonstrate the benefits of multifidelity approaches for applications in design, optimization and uncertainty quantification.

**Dr. Karen Willcox** is Professor of Aeronautics & Astronautics in the Aerospace Computational Design Laboratory at the Massachusetts Institute of Technology. She is also Co-Director of the MIT Center for Computational Engineering and Associate Head of the Department of Aeronautics & Astronautics. She holds a Bachelor of Engineering Degree from the University of Auckland, New Zealand, and masters and PhD degrees from MIT. Before joining the faculty at MIT, she worked at Boeing Phantom Works with the Blended-Wing-Body group. Prof. Willcox's research and teaching interests lie in computational simulation and optimization of engineering systems with two major research focuses. The first is model reduction for large-scale systems with applications in uncertainty quantification, inverse problems, decision under uncertainty, and multifidelity design methods. The second is aircraft system design and optimization with particular emphasis on multifidelity modeling.

**DATE: Wednesday, October 9, 2013**

**TIME: 2:00—3:00 p.m.**

**LOCATION: Macdonald Engineering Bldg, RM 267**



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