

Computational techniques for the analysis and robust design of complex engineering systems*

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This presentation will review a number of diverse computational techniques that are being developed in our laboratory towards the analysis and design of complex engineering systems. We will emphasize building of meta-models from continuum systems and from sensor data using advanced Bayesian computation, statistical learning and information theoretic algorithms. Methodologies for uncertainty quantification in engineering analysis and robust inverse design will also be discussed. Such techniques cannot be useful for realistic applications without the development of computationally efficient parallel algorithms. Finally, a number of examples from various engineering disciplines (multiscale materials modeling, materials-by-design, transport processes, etc.) will be shown to demonstrate the synergies and potential of such computational techniques.

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