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Center for Computational Mathematics Seminar

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Formulation and Solution of Stochastic Inverse Problems for Science and Engineering Models

Abstract:

The stochastic inverse problem for determining parameter values in a physics model from observational data on the output of the model forms the core of scientific inference and engineering design. We describe a recently developed formulation and solution method for stochastic inverse problems that is based on measure theory and a generalization of a contour map. In addition to a complete analytic and numerical theory, advantages of this approach include avoiding the introduction of ad hoc statistics models, unverifiable assumptions, and alterations of the model like regularization. We present a high-dimensional application to determination of parameter fields in storm surge models. We conclude with recent work on defining a notion of condition for stochastic inverse problems and the use in designing sets of optimal observable quantities.

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