



THE UNIVERSITY OF CHICAGO

Departments of Computer Science, Mathematics, Statistics and the Computation Institute
SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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Discrete-Time Approach to Stochastic Parameterization and Model Reduction

THURSDAY, May 18, 2017 at 4:30 PM
226 Jones Laboratory, 5747 S. Ellis Avenue
Host: Jonathan Weare

ABSTRACT

There are many high-dimensional dynamical systems of interest in science and engineering that are too complex or computationally expensive to fully resolve, and where only a relatively small subset of the degrees of freedom are observable and of direct interest. Under these conditions, it is useful to derive low-dimensional models that can predict the evolution of the variables of interest without reference to the remaining degrees of freedom, and reproduce their statistics at an acceptable cost. This talk concerns a discrete-time, parametric approach to the problem of constructing reduced models from data. I will discuss some of the theoretical and practical issues that arise, including the representation of memory and noise effects. The method is illustrated using the Kuramoto-Sivashinsky equation, a prototypical model of spatiotemporal chaos. Time-permitting, I will also discuss a connection between this method and the Mori-Zwanzig formalism of nonequilibrium statistical mechanics. This is joint work with Alexandre Chorin and Fei Lu.

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