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Reconstruction of effective stochastic dynamics from data, with application to subgrid-scale modeling.

D.T. Crommelin and E. Vanden-Eijnden

Courant Institute of Mathematical Sciences, New York University (crommelin@cims.nyu.edu)

Construction of stochastic models that describe the effective dynamics of observables of interest is an useful instrument in various fields of application, such as physics, climate science, and finance. We will present a new technique for the construction of such effective models from timeseries. The approach centers on the minimization of an object function that measures the difference between the eigenspectrum of the generator of the stochastic process (for example, the Fokker-Planck operator) and a reference eigenspectrum obtained from the data. The application of this technique to the topic of subgrid-scale modeling will be discussed.