THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Pre-classification based stochastic reduced-order model for time-dependent complex system

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Abstract

In this lecture, I will introduce a novel stochastic reduced-order model (SROM) for complex systems by combining clustering and classification strategies. Specifically, the distance and centroid of centroidal Voronoi tessellation (CVT) are redefined according to the optimality of proper orthogonal decomposition (POD), thereby obtaining a time-dependent generalized CVT, and each class can generate a set of cluster-based POD (CPOD) basis functions. To learn the classification mechanism of random inputs, a naive Bayes pre-classifier and clustering results are applied. Then for new input, the set of CPOD basis functions associated with the predicted label is used to reduce the corresponding model. Rigorous error analysis is shown, and a discussion in the stochastic Navier-Stokes equation is given to provide a context for the application of this model. Numerical experiments verify that the accuracy of our SROM is improved compared with the standard POD method.

Date: October 12, 2021 (Tuesday)
Time: 4:00 – 5:00pm (Hong Kong Time)
Venue: Room 210, Run Run Shaw Bldg., HKU
and
ZOOM: https://hku.zoom.us/j/
Meeting ID: 913 6532 3891
Password: 310656

Attendance limited
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All are welcome