

Distinguished Lecture for HKSIAM and Hong Kong Universities

How to Extract Transition Phenomena from Noise Data?



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Abstract

Dynamical systems in engineering and science are usually under random fluctuations (either Gaussian or non-Gaussian noise). Observational, experimental and simulation data for such systems are noisy and abundant. The governing laws for complex dynamical systems are sometimes not known or not completely known.

This presentation is about extracting stochastic governing laws and associated transition phenomena from noisy data of dynamical systems. The interactions between data science and dynamical systems are becoming exciting. On the one hand, dynamical systems tools are valuable for extracting information from datasets. On the other hand, data science techniques are indispensable for understanding dynamical behaviors with observational data.

I will present recent progress on extracting stochastic governing laws and transition phenomena from noisy data. Meanwhile, I will also highlight mathematical issues at the foundation of relevant data science learning approaches.