MIT
MATHEMATICS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MATHEMATICS

Simple Person's Applied Math Seminar (SPAMS)

Thursday, March 10, 2022

6:00pm – 6:45pm   Room : 2 - 132

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(MIT Mathematics)

"Learning and predicting complex systems dynamics from single-variable observations"

Abstract

Advances in model inference and data-driven science have enabled the accurate discovery of governing equations from observations alone, accelerating our understanding and control of dynamical systems. However, despite the ever-growing amount of experimental data collected, many physical and biological systems can only be partially observed. Here, building on recent progress in the inference and integration of nonlinear differential equations, we introduce an approach to learn a model using observations of just a single variable within a multi-variable dynamical system, and use this model to accurately predict future dynamics. Furthermore, we validate our approach on a variety of physical, chemical and biological systems which exhibit nonlinear dynamics such as relaxation oscillations and limit cycles. This is joint work with Alasdair Hastewell, Dominic Skinner, Jan Totz and Jörn Dunkel.