



CSC Seminar

SPEAKER

Dr. Stefan Klus

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TITLE

Data-driven analysis of complex dynamical systems

ABSTRACT

Many dimensionality and model reduction techniques rely on estimating dominant eigenfunctions of associated dynamical operators from data. Important examples include the Koopman operator and its generator, but also the Schrödinger operator. We will present kernel-based methods for the approximation of transfer operators and differential operators in reproducing kernel Hilbert spaces and show how eigenfunctions can be estimated by solving auxiliary matrix eigenvalue problems. We will illustrate the results with the aid of guiding examples and highlight potential applications in molecular dynamics, fluid dynamics, and quantum mechanics. Furthermore, we will exploit relationships between the graph Laplacian and transfer operators and in particular between clusters in undirected graphs and metastable sets and then use a generalization of the notion of metastability to derive clustering algorithms for directed and time-evolving graphs.

Tuesday, November 30, 2022 at 2 pm
seminar room Prigogine