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On Matching, and Even Rectifying, Dynamical Systems through Koopman Operator Eigenfunctions

Matching dynamical systems, through different forms of conjugacies and equivalences, has long been a fundamental concept, and a powerful tool, in the study and classification of non-linear dynamic behavior (e.g. through normal forms). In this presentation we will argue that the use of the Koopman operator and its spectrum is particularly well suited for this endeavor, both in theory, but also especially in view of recent data-driven algorithm developments. We believe, and document through illustrative examples, that this can nontrivially extend the use and applicability of the Koopman spectral theoretical and computational machinery beyond modeling and prediction, towards what can be considered as a systematic discovery of “Cole-Hopf-type” transformations for dynamics.