



Karlstad Applied Analysis Seminar (2024)

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The Surprising Robustness and Computational Efficiency of Weak Form System Identification.

Abstract

Recent advances in data-driven modeling approaches have proven highly successful in a wide range of fields in science and engineering. In this talk, I will briefly discuss several ubiquitous challenges with the conventional model development / discretization / parameter inference / model revision loop that our methodology attempts to address. I will present our weak form methodology which has proven to have surprising performance and robustness properties. In particular, I will describe our equation learning (WSINDy) and parameter estimation (WENDy) algorithms. Lastly, I will discuss applications to several benchmark problems, illustrating how our approach addresses several of the above issues and offers advantages in terms of computational efficiency, noise robustness, and modest data needs (in an online learning context).