

CRUNCH Seminars at Brown, Division of Applied Mathematics

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Multifidelity and Machine Learning for Turbulent Flows

Ludger Paehler

Technische Universität München

In this talk I present an outlook on current and recent work that we have been undertaking to apply concepts from Multifidelity and Machine Learning to Fluid Dynamics under the premise of complementing classical approaches to unearth new, deeper insights into the underlying physics. I begin by motivating the necessity of Multifidelity by outlining the key characteristics of typical turbulent flows to then show how Multifidelity, combined with Machine Learning, allows for the quantification of uncertainties in previously inaccessible problems. I then proceed to outline how we have begun to successfully employ machine learning to reach for a deeper understanding of the errors of numerical schemes and finish by outlining necessary amendments one needs to make if one attempts to learn the dynamics of non-linear Fluid Dynamics problems.