MATH-IMS Joint Applied Mathematics Colloquium Series
The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

Date: Aug 26, 2022 (Friday)
Time: 4:00-5:00pm (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/92775210812
Deep Learning and Computations of PDEs
Speaker: Professor Siddhartha Mishra
ETH Zürich

Abstract: Partial Differential Equations (PDEs) are ubiquitous in the sciences and engineering. Although very successful, traditional numerical methods can be very expensive, even infeasible, for a variety of problems. In this context, we present machine learning techniques that can accelerate and enable efficient computations of PDEs. We consider supervised deep learning, unsupervised learning in the form of physics informed neural networks (PINNs) and operator learning and describe how these frameworks are used to approximate PDEs. Both theoretical results as well as extensive numerical experiments will be presented.

Bio: Prof. Mishra is currently a Professor of Applied Mathematics and head of the Computational and Applied Mathematics Laboratory at ETH Zurich, Switzerland. Prof. Mishra received his Ph.D in Applied Mathematics at Tata Institute of Fundamental Research, India in 2005. After a postdoctoral experience at the University of Oslo, Norway, he moved to ETH, Zurich in 2009. Prof. Mishra's research interests lie in scientific computing, computational fluid dynamics and astrophysics, nonlinear PDEs, modeling and simulation of biological systems, uncertainty quantification and machine learning. Besides mentoring many outstanding students and postdocs, his work on the design and analysis of efficient numerical methods for hyperbolic systems of conservation laws, their implementation on state-of-the-art HPC platforms and applications in science and engineering have been recognized by many awards and honors. These include European Research Council (ERC) Starting Grant (2012), Richard von Mises prize (2015), ERC Consolidator Grant (2017), Jacques Louis Lions Award (2018), Collatz Prize (2019), Infosys Prize (2019) and Germund Dahlquist Prize (2021). He was also an invited speaker at the International Congress of Mathematicians (2018).