



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

**Enjoy the Best of Both Worlds:
A Neural-Network Warm-Start Approach for PDE Problems**

By

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Abstract

Partial differential equations (PDEs) are among the most ubiquitous tools in modeling natural phenomena, and various numerical methods have been developed for decades to solve PDE problems. While deep learning has introduced new techniques to the field, the limited accuracy of deep neural networks hinders their application to scientific problems that require high precision.

This talk will present a warm-start approach that combines the strengths of deep neural networks and classical numerical solvers. The approach uses neural networks to provide an initial guess, enabling classical numerical solvers to achieve a good solution more efficiently. We will demonstrate the advantages of the proposed method through two examples: the inverse scattering problem and the Reynolds-averaged Navier-Stokes equations. In both examples, the combination of the classical PDE solver and the neural network outperforms either approach alone. The potential of this approach will be discussed, along with the new challenges that must be tackled to solve challenging scientific problems using this new paradigm.

Date : 31 August 2023 (Thursday)

Time : 4:00pm - 5:00pm

Venue : Room 2405 (Lifts 17/18)

All are Welcome!