



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

In-Context Learning in Scientific Computing

By

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Abstract

Transformer-based foundation models, pre-trained on large datasets spanning a wide range of tasks, have shown remarkable adaptability to diverse downstream applications—even in low-data regimes. A particularly striking capability is in-context learning (ICL): when given a prompt containing a few examples from a new task alongside a query, these models can produce accurate predictions without any parameter updates. This emergent behavior is often viewed as a paradigm shift for transformers, yet its theoretical foundations remain only partially understood. In this talk, I will present recent theoretical progress toward understanding ICL in scientific computing. I will focus on understanding how transformer architectures can implicitly perform task adaptation in three representative problem classes: learning solution operators of PDEs, dynamical system prediction and generative modeling.

Date : 23 June 2026 (Tuesday)

Time : 10:00a.m.-11:00a.m.

Venue : Room 4504 (Lift 25/26)

All are Welcome!