FUDAN UNIVERSITY

# Applied Math Ph.D. Seminar

## AI Methods for Solving Partial Differential Equations

**Speaker:** Weixin Liao (Shanghai Jiao Tong University)

**Time:** 2026-11-26, 16:10 to 17:00

**Location:** Rm 1801, Guanghua East Tower

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**Abstract:** Partial differential equations (PDEs) are fundamental mathematical tools for describing complex physical systems and their underlying dynamics, with widespread applications in fluid mechanics, materials science, quantum computing, and engineering optimization. In recent years, driven by the growing integration of artificial intelligence and scientific computing, machine learning-based approaches for efficiently solving PDEs have emerged as an important research direction in AI for Science. However, traditional numerical methods face significant challenges, including the curse of dimensionality and high computational costs, while existing data-driven approaches often struggle with limited physical consistency, numerical stability, and generalization capabilities. This talk focuses on AI-driven methods for efficient and reliable PDE solving. We will first introduce the fundamental principles and representative approaches of neural operator learning, highlighting the potential of artificial intelligence for modeling and simulating complex physical systems. Building on this foundation, we will present our team's recent research, with an emphasis on evolution operator learning for high-dimensional PDEs, physics-constrained neural solvers, and efficient computational methods for solving large-scale numerical systems. Through these advances, we aim to explore how operator learning can improve the efficiency, accuracy, and generalizability of PDE solvers.