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Invited Speaker

Dr. Yadi Cao, UC San Diego

"Scaling AI for Engineering with Realistic Surrogate Models for High-Fidelity Simulations"

Thursday, May 28, 2026 • 2:00PM • SPRK 229 (Formerly Global) • Zoom

Abstract:

Modern science and engineering rely on high-fidelity simulations and experiments that take hours to days per run, creating a fundamental bottleneck for design exploration. Machine-learning surrogates can ease this bottleneck, but most methods face serious constraints in realistic deployment. This talk presents two works addressing these challenges: (1) BSMS-GNN, a multi-scale graph neural network that preserves connectivity when learning physics on large-scale unstructured meshes; and (2) VICON, an in-context-learning neural operator that adapts across different physics and operating conditions without retraining. The talk closes with a brief discussion of recent work on LLM agents that orchestrate such surrogate toolkits for research automation.

Bio:

Yadi Cao develops novel AI methods to scale up engineering research by reducing experimental costs and labor of experts. His research has made a significant impact in fusion energy and computational fluid dynamics: TGLF-SiNN, which delivers a 48x computational speedup for fusion simulations and is integrated into General Atomics' tokamak pipeline, and BSMS-GNN, which enables learning realistic turbomachinery simulations on million-node meshes. Yadi is a postdoctoral researcher at UC San Diego with Professor Rose Yu. He completed his Ph.D. at UCLA, co-advised by Professors Chenfanfu Jiang and Demetri Terzopoulos.