BOSTON UNIVERSITY

Boston University College of Arts & Sciences
Center for Space Physics

2025 SPACE PHYSICS SEMINAR SERIES

Recent Advances in PINNs and Deep Neural Operators

Abstract: We will review physics-informed neural networks (PINNs) and summarize available extensions for applications in computational science and engineering. We will also review new representations of interpretable deep neural operators that take as inputs functions and distributions for system identification and real time inference. We will then present how we can interface PINNs and neural operators, such as DeepOnet. with finite elements for data assimilation, inverse problems and multiscale problems. In addition, we will highlight how we can develop fast solvers based on preconditioning the linear systems using DeepOnet that leads to order of magnitude speed up and overcomes the problems encountered with multigrid methods. Finally, we will present new bio-inspired architectures, including spiking neural networks that are the best candidates for breaking the current trend of extremely steep demand for GPU computing using artificial neural networks.

Thursday, January 23rd

3:30 - 4:30 p.m.

725 Commonwealth Ave | Room 502

Prof. George Karniadakis

Brown University