



Department of Mathematics
The Chinese University of Hong Kong

數學系
香港中文大學

Phone: (852) 3943 7988 • Fax: (852) 2603 5154 • Email: dept@math.cuhk.edu.hk (Math. Dept.)
Room 220, Lady Shaw Building, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

Applied and Numerical Analysis Seminar

Error Analysis and Optimization Methods for Physics-Informed Neural Networks

Dr. Marius Zeinhofer
Simula Research Laboratory

Abstract

In the first part of the talk, we discuss error estimates for physics-informed neural networks (PINNs) for a wide range of linear PDEs, including elliptic, parabolic and hyperbolic equations. For the analysis, we propose an abstract framework in the language of bilinear forms, and we show the required continuity and coercivity estimates for the mentioned equations. Our results illustrate that the L2 penalty approach that is commonly employed for boundary and initial conditions provably leads to a pronounced deterioration in convergence mode. In the second part, we focus on optimization methods for PINNs and related methods from an infinite-dimensional viewpoint. More precisely, we will discretize well known function space algorithms (such as Newton's method) in the tangent space of a neural network ansatz class and show that they lead to highly effective methods in practice.

Date: 20 March, 2024 (Wednesday)
Time: 4:30pm – 5:30pm (Hong Kong Time)
ZOOM link: <https://cuhk.zoom.us/j/98241093146>
Meeting ID: 982 4109 3146

All are Welcome