



MATH-IMS Joint Applied Mathematics Colloquium Series The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

Date: Mar 10, 2023 (Friday)

Time: 10:00-11:00 (Hong Kong Time)

Zoom Link: <https://cuhk.zoom.us/j/92775210812>

Weak Adversarial Networks (WAN): A Computational Method for High-dimensional PDEs and Inverse Problems

*Speaker: Professor Haomin Zhou
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Abstract: We present a weak adversarial network approach to numerically solve a class of PDEs and inverse problems. The weak formulation of PDE is leveraged with deep neural networks and induces a minimax problem. The solution can be computed by finding the saddle points in the network parameters. As the parameters are updated, the network gradually approximates the solution. The proposed method is mesh-free without any spatial discretization and is suitable for problems with high dimensionality and low regularity on solutions. Theoretical justifications are provided on the convergence of the proposed algorithm. Numerical experiments on a variety of test problems demonstrate the promising accuracy and efficiency of this approach. This presentation is based on the joint work with Gang Bao (Zhejiang U.), Xiaojing Ye (Georgia State U.) and Yaohua Zang (Zhejiang U.).

Bio: Haomin Zhou is a professor in the School of Mathematics at Georgia Institute of Technology. He received his B.S. in pure mathematics from Peking University, M.Phil in applied mathematics from the Chinese University of Hong Kong, and Ph.D. in applied mathematics from University of California, Los Angeles in 1991, 1996 and 2000 respectively. He spent 3 years in California Institute of Technology as a postdoctoral scholar and von Karman instructor, before joining Georgia Institute of Technology as an assistant professor in 2003. His research interests include numerical analysis and scientific computing, specialized in PDE and wavelet techniques in image processing, numerical methods for stochastic differential equations, and discrete optimal transport. He is a recipient of the NSF CAREER AWARD in applied and computational mathematics in 2007, and Feng Kang prize in scientific computing in 2019.