



復旦大學
FUDAN UNIVERSITY

Applied Math Ph.D. Seminar

Weak Adversarial Network (WAN): A Deep Learning Framework for Solving High Dimensional Inverse Problems

Speaker: Yaohua Zang (Zhejiang University)

Time: 2021-06-10, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Advisor: Gang Bao (Zhejiang University)

Abstract: We present a weak adversarial network approach to numerically solve a class of inverse problems, including electrical impedance tomography. The weak formulation of the PDE for the given inverse problem is leveraged, where the solution and the test function are parameterized as deep neural networks. Then, the weak formulation and the boundary conditions induce a minimax problem of a saddle function of the network parameters. As the parameters are alternatively updated, the network gradually approximates the solution of the inverse problem. Theoretical justifications are provided on the convergence of the proposed algorithm. The proposed method is completely mesh-free without any spatial discretization, and is particularly suitable for problems with high dimensionality and low regularity on solutions. Numerical experiments on a variety of test inverse 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 Haomin Zhou (Georgia Tech.).