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Gang Bao, Xiaojing Ye, Yaohua Zang and Haomin Zhou* (hmzhou@math.gatech.edu),
Atlanta, GA 30332. *Inverse Weak Adversarial Networks (IWAN): A Computational Method for
High-dimensional Inverse Problems.*

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 Yaohua Zang (Zhejiang U.). (Received January 17, 2021)