

Texas State University
Department of Mathematics Colloquium
Friday, February 3, 2023
3:30pm in Derrick 329

A priori error analysis and greedy training algorithms for neural networks solving PDEs



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Abstract: We provide an a priori error analysis for methods solving PDEs using neural networks. We show that the resulting constrained optimization problem can be efficiently solved using greedy algorithms, which replaces stochastic gradient descent. Following this, we show that the error arising from discretizing the energy integrals is bounded both in the deterministic case, i.e. when using numerical quadrature, and also in the stochastic case, i.e. when sampling points to approximate the integrals. This innovative greedy algorithm is tested on several benchmark examples to confirm its efficiency and robustness.