

Preconditioning and Numerical Stability in Neural Network Training for Parametric PDEs

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Abstract

In the context of training neural network-based approximations of solutions of parameter-dependent PDEs, we investigate the effect of preconditioning via well-conditioned frame representations of operators and demonstrate a significant improvement on the performance of standard training methods. We also observe that standard representations of preconditioned matrices are insufficient for obtaining numerical stability and propose a generally applicable form of stable representations that enables computations with single- and half-precision floating point numbers without loss of precision.