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Eric C. Cyr*, eccyr@sandia.gov, and **Gordon E. Moon**. *Parallel-In-Time Training of Recurrent Neural Networks*.

Recurrent neural networks can "learn" complex nonlinear relationships in sequences of data. Various flavors of recurrent neural networks, like long short-term memory (LSTM), have seen successes in reduced order modeling approaches that may be advantageous in the context of digital twin construction. Despite their success, training these models remains a challenging and computationally intensive undertaking. In this talk we will present a new parallel-in-time training algorithm that exploits a multigrid scheme to accelerate both forward and backward propagation for use in gradient calculations. This approach is based on a recently developed layer-parallel training technique for deep residual networks. The key step is to introduce a parallel decomposition between time steps in the sequence and then exploit an inexact propagation with the neural network. The multigrid method used in this approach stitches these subdomains together with sufficient accuracy to ensure rapid convergence. (Received August 31, 2021)