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Prediction of Transport Phenomena in Plasmas with Neural Networks,* C.J. Luna, *ASU*; O. Meneghini, *ORAU*; S.P. Smith, *General Atomics* – For our analysis, a multi-layer feed-forward back-propagation neural network is built and trained using data that is taken from the DIII-D database. It is observed that given the same parameters that the most sophisticated numerical codes use, the neural network model is able to accurately predict the heat transport profiles observed in the DIII-D experiments across the whole plasma radius. Consistent results have been obtained over a broad spectrum of plasma configurations, including L-mode discharges that gyro-kinetic models are unable to reproduce. Furthermore, by investigating the weights of the input parameters that are selected by the trained neural network, we are able to more accurately gauge the physical importance of any given input parameter. This poster reports a systematic study of the neural network performance for different input signals, training data sets, and plasma configurations.

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