Abstract Submitted
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Data-Driven Profile Prediction[1] JOSEPH ABBATE, Princeton Plasma Physics Lab, RORY CONLIN, EGEMEN KOLEMEN, Princeton University — A new, fully data-driven transport model has been developed that uses neural networks to predict plasma profiles on a scale of the energy confinement time into the future given actuators and the present plasma state. The model was trained and tested on DIII-D data from the 2010-2018 experimental campaigns. The model is accurate on average and is shown to scale properly with actuators, with rotational transform predictions the worst and pressure predictions the best. The model can run in milliseconds and is very simple to use. This makes it a potentially useful tool for operators and physicists when planning plasma scenarios. It also is a candidate for doing phase-space exploration without going through the DIII-D database or complicated and expensive simulation codes. A reduced model using only realtime diagnostics has also been developed and formed the basis for a model-predictive control algorithm implemented and successfully tested on DIII-D.

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