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Prediction of DIII-D pedestal density structure from externally controllable parameters[1] EMI ZEGER, UCLA, FLORIAN LAGGNER, ALESSANDRO BORTOLON , PPPL, CRISTINA REA, MIT, JIN JIN ZHAO, University of Chicago — The plasma pedestal is an increase in pressure at the edge of the plasma in a tokamak's high confinement mode (H-mode). The pedestal improves plasma and fusion performance, so the relationship between controllable parameters and the pressure of the pedestal must be understood or predicted to optimize the tokamak as an energy source. The relationship between the pedestal density and externally controllable parameters is complex, and current models are limited in practicality and speed. A neural network (NN) is designed to predict the pedestal density from controllable variables such as plasma shape, heating method and power, and gas puff. The NN is trained on data from the DIII-D tokamak, which provides pedestal data for a wide variety of operational parameters over multiple run campaigns. This data was first pre-processed to discard edge localized modes (ELMs), building a database of pedestal parameters from pre-ELM conditions. Then the NN will be trained, tuned, and tested on data subsets from the database. Envisaged improvements of the NN will help to avoid overfitting by incorporating measurement uncertainties and applying pre-processing of features.

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