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An Empirical Neural Network Transport Model Fit to a Large DIII-D Database[1] ADAM EUBANKS, Deep Run High School, ORSO MENEGHINI, STERLING SMITH, General Atomics, TOM NEISER, ORAU — An experimentally trained saturation rule for the quasilinear TGLF turbulent transport model has been obtained. The wavenumber (k) spectrum of the rule is prescribed as a + b log (k) / k^c, and the coefficients a,b,c are the output of a neural network trained to produce fluxes similar to experimentally inferred fluxes for the nominal parameters of a database of DIII-D discharges. Different neural network architectures and hyperparameters were tested, including reducing the coefficients produced by the model from 6 (having a separate saturation rule per unstable mode) to 3 (one rule for all modes). Using symbolic regression through genetic algorithms, analytic expressions were obtained to map the relationships between a,b,c and input parameters. The correlations of a with collisionality and c with electron temperature gradient scale length are particularly strong. Other forms of the saturation rule wavenumber spectrum prescription are explored.

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