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Neural-network accelerated fusion simulation with self-consistent core-pedestal coupling[1] O. MENEGHINI, J. CANDY, P.B. SNYDER, G. STAEBLER, E. BELLI, General Atomics — Practical fusion Whole Device Modeling (WDM) simulations require the ability to perform predictions that are fast, but yet account for the sensitivity of the fusion performance to the boundary constraint that is imposed by the pedestal structure of H-mode plasmas due to the stiff core transport models. This poster presents the development of a set of neural-network (NN) models for the pedestal structure (as predicted by the EPED model), and the neoclassical and turbulent transport fluxes (as predicted by the NEO and TGLF codes, respectively), and their self-consistent coupling within the TGYRO transport code. The results are benchmarked with the ones obtained via the coupling scheme described in [Meneghini PoP 2016]. By substituting the most demanding codes with their NN-accelerated versions, the solution can be found at a fraction of the computation cost of the original coupling scheme, thereby combining the accuracy of a high-fidelity model with the fast turnaround time of a reduced model.

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