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Predictive Modeling of Tokamak Density, Temperature and Toroidal Rotation Profiles[1] T. RAFIQ, A.H. KRITZ, Lehigh University, A.Y. PANKIN, Tech-X Corp, X. YUAN, PPPL — The predictive TRANSPort and integrated modeling code, PTRANSP, is used to compute electron density, temperature, toroidal velocity and radial electric field profiles. The Multi-Mode anomalous transport model, MMM7.1, or the Trapped Gyro-Landau Fluid model, TGLF, is used along with the new numerical transport solver, PT-SOLVER, in carrying out the simulations. An option to evolve the electron density profiles has been recently introduced to PT-SOLVER. The effects associated with this new option on the plasma profiles in the predictive PTRANSP simulations that advance the coupled density, energy, and momentum equations are presented. The self-consistent evolution of the equilibrium is computed using the TEQ or ISOLVER module. Neoclassical transport is calculated using the Chang-Hinton model. Neutral beam heating and current drive are obtained using the NUBEAM module and ion cyclotron heating and current drive are obtained using the full wave TORIC module. Results are presented for L-mode and H-mode discharges in order to illustrate the extent to which the MMM7.1 and TGLF transport models yield profiles that are consistent with experimental data. The comparison is quantified by calculating the RMS deviations and Offsets. The plasma parameter dependencies associated with the anomalous transport resulting from the use of the MMM7.1 and TGLF models are illustrated.

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