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Physics Basis of Multi-Mode Module v7.1 T. RAFIQ, A.H. KRITZ, G. BATEMAN, L. LUO, Lehigh University — In this study, a description and derivation of the theory based Multi-Mode module, MMM v7.1, is presented together with a few examples of simulations of DIII-D tokamak discharges. The module consists of a combination of theory-based transport models that is used to predict the evolution of temperature, density and toroidal rotation profiles in tokamak plasmas. The MMM v7.1 is a multi-fluid model that includes ion and electron temperature gradient modes (ITG and ETG), trapped electron modes (TEM), ideal MHD and drift resistive inertial ballooning modes (DRIBM). The combination of models is necessary in order to include the different physical phenomena that provide contributions to transport in different radial regions of the plasma discharge. For example, the ITG and TEM modes contribute to transport mostly in the plasma core, whereas, DRIBM transport contributes at the plasma edge. Simulated temperature and current density profiles using MMM v7.1 in PTRANSP are compared with data from DIII-D tokamak discharges. The comparison includes the entire profiles from the magnetic axis to the plasma edge.

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