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Self-consistent Modeling of the Pedestal in Tokamak H-mode Plasmas A.Y. PANKIN, G. BATEMAN, A.H. KRITZ, Lehigh U., C.S. CHANG, S. KU, G. PARK, NYU, J. CUMMINGS, Caltech, C. SOVINEC, U. Wisconsin, P. SNYDER, General Atomics, L.D. PEARLSTEIN, LLNL, N. PODHORSZKI, UC Davis, S. KLASKY, ORNL — Simulations of H-mode pedestal growth and ELM crashes in DIII-D discharges are carried out using a combination of four computer codes — XGC gyro-kinetic, TEQ equilibrium, ELITE linear ideal MHD stability, and NIMROD extended MHD. The pedestal modeling uses computational tools that are most appropriate for the different physical effects and processes. The approach results from a multi-institutional effort to build a robust suite of codes for self-consistent modeling of the H-mode pedestal in tokamak plasmas. The XGC code is used for modeling of neoclassical effects that lead to the H-mode pedestal formation. The XGC code handles charged particle and neutral collisions using a Monte Carlo approach and a model for the source of neutrals at the wall. The TEQ free-boundary equilibrium code is used to follow the equilibrium changes as the plasma profiles evolve in XGC. The triggering of an ELM crash is indicated by the ELITE code, which computes the linear growth rate of selected modes and takes into account the stabilizing diamagnetic effect. Once an ELM crash is triggered, the NIMROD code is used to follow the nonlinear evolution of the ELM crash. The comparison of the numerical simulations and DIII-D data is discussed.

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