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MHD Pedestal Formation in Time-Dependent Simulations[1] LUCA GUAZZOTTO, University of Rochester (now Auburn University), RICCARDO BETTI, University of Rochester, STEVE JARDIN, Princeton Plasma Physics Laboratory — Finite toroidal and poloidal flows are routinely observed in the edge plasma region of tokamak experiments. MHD theory predicts that when the poloidal velocity is transonic with respect to the poloidal sound speed ($c_{sp} \equiv c_s B_p/B$, where B_p is the poloidal field) a transient will develop. After the end of the transient, a steady-state MHD pedestal in plasma density and pressure is left, with the height of the pedestal depending on the poloidal location. The formation of the MHD pedestal was demonstrated with time-dependent simulations with the resistive-MHD code SIM2D. In the present work, we explore the effect of additional physics on the formation of the pedestal. The advanced model implemented in M3DC1 is used to validate and extend SIM2D calculations. Since M3DC1, contrary to SIM2D, was not developed to study transonic transients, this also gives a strong independent verification of the correctness of the MHD pedestal model. Special focus is given to poloidal viscosity, which is already implemented in M3DC1 and is being implemented in SIM2D. Analytic calculations complement and support numerical results.

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