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Testing Ion-orbit Loss Models in MHD[1] JACOB KING, ERIC HOWELL, SCOTT KRUGER, ALEXEI PANKIN, Tech-X Corporation, BRIAN GRIERSON, SHAUN HASKEY, PPPL, RICH GROEBNER, General Atomics, JAMES CALLEN, University of Wisconsin, SINA TAHERI, URI SHUMLAK, University of Washington — The dynamics of the tokamak H-mode edge pedestal are known to depend strongly on the flow and its associated shear. The flow profile is critical to determining accessibility to operation in regimes free from edge-localized modes (ELMs), such as those with resonant magnetic-field perturbations or quiescent H-mode. While MHD simulations of these ELM-free regimes is now routine, the physics that determines the pedestal flow structure is outside the scope of the MHD model. Without a fully coupled momentum-transport model, these simulations are limited to being interpretive in nature. Long term, a transport model must incorporate the dominant transport physics in the edge: neoclassical stresses which include ion-orbit loss, high-k turbulent fluxes if needed, neutral fueling, and impurity physics. We present an analysis of DIII-D shot 164988 that incorporates the forces from ion-orbit loss from a drift-kinetic calulation [2] and ion poloidal-flow damping with impurity corrections and fluid neutrals within the NIMROD code [3]. The time-independent forces as well as the time-dependent evolution is computed and compared to the values measured by charge-exchange recombination spectroscopy.

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