Abstract Submitted
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Self-Consistent Calculation of Turbulence and Transport in the Tokamak Edge[1] M.V. UMANSKY, L.L. LODESTRO, T.D. ROGNLIEN, R.H. COHEN, X.Q. XU, LLNL — Progress is described for self-consistent calculations of turbulence and transport in the tokamak edge using the UEDGE transport code and the BOUT turbulence code. Turbulence fluxes and background profile data are exchanged between the codes, and efficient iteration schemes are explored to bridge the very different turbulence and transport time scales. The codes are run under a common Python shell, which provides a convenient environment for automatic coupling. Here a limiter geometry is studied, where a material surface is introduced into the plasma at a specific poloidal location. This produces a simple edge plasma configuration with open and closed field magnetic line regions, supporting plasma instabilities driven by the radial gradients, magnetic curvature and the sheath boundary conditions. Turbulence-driven fluxes of particles and energy, and formation of the electric field well are studied in the coupled system for different poloidal locations of the limiter plate. An important factor affecting the poloidal distribution of the turbulence is the magnetic field shear from nearby X-points, although X-points themselves are outside of the modeled region.

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