Abstract Submitted
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Calculation of Self-Consistent Turbulence and Transport in the Tokamak Edge[1] M.V. UMANSKY, T.D. ROGNLIEN, R.H. COHEN, L.L. LODESTRO, X.Q. XU, Lawrence Livermore National Lab — Results of a self-consistent simulation of turbulence and transport in the tokamak edge are presented. The calculations are done with the transport code UEDGE and the turbulence code BOUT. The turbulence fluxes and background profile data are exchanged between the codes using effective iteration schemes. A midplane limiter case is presented here. The limiter causes parallel plasma losses that strongly affect the radial plasma profiles, and the limiter sheath supports conducting-wall instabilities. Two regimes are observed: (i) weakly intermittent turbulence when the flow shear is large, and (ii) strongly intermittent turbulence when the flow shear is small. The weakly intermittent regime is characterized by small, frequent transport bursts. In this case a large separation of time scales between turbulence and transport allows efficient coupling of turbulence and transport, yielding self-consistent quasi- stationary solutions. The strongly intermittent regime is characterized by large infrequent bursts of transport. In this case the coupling method based on separation of time scales loses its efficiency since the time scales of transport and turbulence overlap, and important nonlinear response functions, e.g. the material erosion rate, can not be correctly described by the time-average profiles.

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