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Gyrokinetic study of electrostatic turbulence transport across magnetic separatrix

S. Ku^{a)}, C.S. Chang^{a)}, M. Adams^{b)} and the CPES team^{c)}

^{a)}Courant Institute of Mathematical Sciences, New York University ^{b)}Columbia University ^{b)}SciDAC FSP Prototype Center for Plasma Edge Simulation <u>cschang@cims.nyu.edu</u>

Gyrokinetic particle code XGC1 is used to study electrostatic turbulence across the magnetic separatrix in a tokamak edge plasma for the first time. XGC1 specializes in evaluating turbulence transport, self-consistently with background neoclassical transport and equilibrium, in a realistic edge geometry read in from geqdsk file. The complicated geometry calls for an unstructured triangular mesh. XGC1 can operate either in delta-f or full-f mode. The latter is necessary to consider the non-thermal ion equilibrium with wall losses and neutral sources. Transport rates from electrostatic turbulence will be reported in an L-mode type, low-beta pedestal where ExB flow shear is weak. Even though the turbulence may be electromagnetic as the pedestal steepens, influence of the electrostatic turbulence transport from the self-consistent interaction with strong ambient ExB flow shearing will also be discussed. Code verification is performed in the well-known "cyclone" geometry.

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