

Abstract Submitted
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Effect of neutral recycling on pedestal turbulence and transport J.

LANG, S.-H. KU, C.-S. CHANG, D. STOTLER, Princeton Plasma Physics Lab — Neutral ionization and charge exchange are one of the dominant parts of the pedestal physics. However, study of their kinetic effects on the gyrokinetic micro-turbulence has been difficult due to the multi-physics complexity and the lack of high performance computing resource. In this work, we turned on the neutral Monte-Carlo routine in the comprehensive full-f gyrokinetic code XGC1 in diverted magnetic field geometry. Neoclassical and electrostatic turbulence physics are considered together. Simulation shows that the neutral recycling plays an important role in the pedestal formation, and the turbulence and transport. Neutrals provide not only a particle source through ionization, but also a heat sink through charge exchange. The physics involved is nonlocal. As the neutral recycling is reduced, the edge ITG turbulence intensity decreases, consistently with the observations from L-H transition and Li coating. In addition, the nonlocal turbulence affects the penetration of cold particles from the edge to the core region.

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