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Gyrokinetic simulation of spontaneous plasma fueling from inward particle pinch[1] J. LANG, C.S. CHANG, S. KU, D.P. STOTLER, PPPL — Plasma fueling from edge to core, as have been consistently observed in tokamak experiments, have yet to be explained theoretically. Recently, it has been shown that electrostatic plasma turbulence may be able to drive an inward particle pinch of colder particles,[2,3] while warmer particles are driven outward. However, these transport studies were performed in δf codes in which the source of the colder particles could not sustain for steady-state consistency. Neutral ionization and charge exchange effects are expected to play an important role in the inward particle pinch by providing particle sources and strong local cooling. We will present full-f gyrokinetic studies of global electrostatic turbulence together with neutral particle transport in realistic divertor geometry. Our primary simulation results have shown that the global nonlinear turbulence can propagate these effects from the plasma edge to the core and that the kinetic electron dynamics bring simulated particle pinch magnitude closer to the experimental observation.[4] It is also found that the generation of nonlinear quasi-coherent structures (resembling blobs and holes) in the strongly ExB-sheared edge pedestal plays a significant role in the cold particle pinch physics. More complete simulations, data analysis and detailed comparison with experiment will be provided.

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[2]W Wan *et al*, Phys. Plasmas **18**, 056116 (2011); W Wan *et al*, Phys. Plasmas **17**, 040701 (2010).
[3]C. Angioni *et al.*, Phys. Plasmas **16**, 060702 (2009).
[4]M. Xu *et al.*, IAEA 2012.

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