

Abstract Submitted
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Modeling full radial electric field and flow shears in gyrokinetic simulations WEIGANG WAN, YANG CHEN, SCOTT PARKER, University of Colorado, RICHARD GROEBNER, General Atomics — The radial electric field (E_r) is important in the turbulence of tokamak plasmas. It affects the growth rate of instabilities through the $E \times B$ shear and changes the real frequency of drift waves by adding a Doppler shift. The modeling of E_r in simulations, however, was usually not complete. The full profiles of the main ion toroidal and poloidal flows were not implemented. In the gyrokinetic electromagnetic particle code GEM, the poloidal flow was assumed to be zero by introducing a parallel flow. However, recent experiments show that the poloidal flow could be important.¹ In this study we add the full main ion rotation flows to GEM, following the comprehensive procedures of Sugama and Horton.² The major contribution to the E_r from the ion toroidal flow is used as E_{r0} , and the result as E_{r1} . The effects to the growth rate and Doppler shift of all terms in the force balance equation are demonstrated using linear simulations of edge and core tokamak plasmas.

¹B.A. Grierson et al., Nucl. Fusion 53 (2013) 063010.

²H. Sugama and W. Horton, Phys. Plasmas 5, 2560 (1998).

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