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A Proposed Gyrokinetic Simulation Scheme for the Equilibrium Potential Well due to Finite Larmor Radius Effects at the Tokamak Edge[1]

W. W. LEE, ROSCOE WHITE, Princeton Plasma Physics Laboratory — A novel mechanism for producing the equilibrium potential well near the edge of a tokamak has been recently proposed [1]. Briefly, because of the difference in gyroradii betweenelectrons and ions, an equilibrium electrostatic potential isgenerated in the presence of spatial inhomogeneity of the backgroundplasma, which, in turn, produces a well associated with the radialelectric field, Er, as observed at the edge of many tokamak experiments. Specifically, this theoretically predicted Er field, which can be regarded as producing a long radial wave length zonal flow, agrees well with recent experimental measurements on JET, NSTX and C-Mod [1]. A possible verification of this new mechanism using a proposed procedure [2] involving global gyrokinetic particle simulation codes and equilibrium MHD codes will be discussed. The approach is iteratively to decouple the transport problem from the equilibrium problem, so that each may be treated accurately, and, then couple them through parameter exchanges. [1] W. W. Lee and R. B. White, Equilibrium Potential Well due to Finite Larmor Radius Effects at the Tokamak Edge, PPPL-5254 (2016). [2] W. W. Lee, Magnetohydrodynamics for Collisionless Plasmas from the Gyrokinetic Perspective, PPPL-5236, to appear in Phys. Plasmas (2016).

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