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Zonal flow generation from trapped electron mode turbulence LU WANG, School of Physics, Peking University, T.S. HAHM, Princeton University, PPPL — Most existing zonal flow generation theory [1,2] has been developed with a usual assumption of $q_r \rho_{i\theta} << 1$ (q_r is the radial wave number of zonal flow, and $\rho_{i\theta}$ is the ion poloidal gyroradius). However, recent nonlinear gyrokinetic simulations of trapped electron mode (TEM) turbulence exhibit a relatively short radial scale of the zonal flows with $q_r \rho_{i\theta} \sim 1$ [3,4,5]. This work reports an extension of zonal flow growth calculation to this short wavelength regime via the wave kinetics approach. A generalized expression for the polarization shielding for arbitrary radial wavelength [6] which extends the Rosenbluth-Hinton formula in the long wavelength limit [7] is applied. The electron nonlinearity effects on zonal flow are investigated by using GTC simulation. This work was supported by the China Scholarship Council (LW), U.S. DoE Contract No. DE–AC02–09CH11466 (TSH, LW), the U. S. DOE SciDAC center for Gyrokinetic Particle Simulation of Turbulent Transport in Burning Plasmas, and the U. S. DOE SciDAC-FSP Center for Plasma Edge Simulation (TSH). [1] P. H. Diamond et al., IAEA-CN-69/TH3/1 (1998). [2] L. Chen, Z. Lin, and R. White, Phys. Plasmas **7**, 3129 (2000). [3] Z. Lin et al., IAEA-CN-138/TH/P2-8 (2006). [4] D. Ernst et al., Phys. Plasmas **16**, 055906 (2009). [5] Y. Xiao and Z. Lin, "Turbulent transport of trapped electron modes in collisionless plasmas", submitted to Phys. Rev. Lett. (2009). [6] Lu Wang and T.S. Hahm, Phys. Plasmas **16**, 062309 (2009). [7] M. N. Rosenbluth and F. L. Hinton, Phys. Rev. Lett. **80**, 724 (1998).

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