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Theory of fine-scale zonal flow generation[1] LU WANG[2], T.S. HAHM, Princeton Plasma Physics Laboratory, Princeton University, Princeton, NJ 08543, USA — Most zonal flow generation theory has been built upon drift wave turbulence with a usual assumption of $q_r \rho_{i\theta} << 1$ [Diamond et al., IAEA-CN-69/TH3/1 (1998), Chen et al., Phys. Plasma 7, 3129 (2000)]. However, recent nonlinear GTC simulations of trapped electron mode (TEM) turbulence exhibit a relatively short radial scale of the zonal flows with $q_r \rho_{i\theta} \sim 1$[Z. Lin et al., IAEA-CN/TH/8-4 (2004)]. This work reports an extension of zonal flow growth calculation via the wave kinetics approach to this short wavelength regime. A generalized expression for the neoclassical polarization shielding [Rosenbluth and Hinton, Phys. Rev. Lett. 80, 724 (1998)] comes from the modern bounce-kinetic equation [Fong and Hahm, Phys. Plasmas 6, 188 (1999)].

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