Abstract Submitted
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Electrostatic gyrokinetics in an axisymmetric torus[1] GRIGORY KAGAN, PETER J. CATTO, MIT — A gyrokinetic change of variables useful for describing electrostatic phenomena in axisymmetric tokamak magnetic field is introduced. In contrast to typical gyrokinetic treatments, canonical angular momentum is taken as the gyrokinetic radial variable rather than the radial guiding center location. Such an approach allows strong radial density gradients, while allowing zonal flow behavior in the presence of strong toroidal rotation. Moreover, neoclassical collision effects naturally enter when the gyrokinetic change of variables is applied to the collision operator. The new, nonlinear gyrokinetic variables are constructed to higher order than is typically the case by generalizing the linear procedure of Lee, Myra and Catto [2]. The nonlinear gyrokinetic equation obtained is expected be useful in analyzing electrostatic behavior in the tokamak pedestal and scrape-off layer. This choice of gyrokinetic variables allows the toroidally rotating Maxwellian solution of the isothermal tokamak limit to be recovered [1]. Moreover, the quasineutrality equation in the long wavelength limit is derived. To verify its consistency, the electrostatic potential obtained from it is compared to the expression found for an isothermal tokamak [1]. References: [1] P. J. Catto and R. D. Hazeltine, Phys. Plasmas **13**, 122508 (2006). [2] X. S. Lee, J. R. Myra and P. J. Catto, Phys. Fluids 26, 223 (1983).

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