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Extension of electrostatic gyrokinetics to transport timescales[1]
FELIX I. PARRA, PETER J. CATTO, Plasma Science and Fusion Center, MIT, Cambridge, MA — We outline our efforts to develop an electrostatic nonlinear gyrokinetic full f model that retains transport timescales and determines the electric potential self-consistently. A set of gyrokinetic variables is defined so that the gyrophase dependent part of the distribution is absorbed into the gyrokinetic variables by extending the linear treatment of Ref. [1]. The resulting gyrokinetic equation is valid for wavelengths as small as the ion Larmor radius and allows us to evaluate the gyrophase independent part of the distribution function through order ρ_i/L. When evaluating the potential, the quasineutrality equation usually employed in gyrokinetics may be inadequate for long wavelengths because the terms that determine the potential and zonal flow for short wavelengths become as small as other terms neglected due to limitations of the gyrokinetic equation. Various means of investigating these limitations and suggestions for testing the radial electric field determined from the gyrokinetic and quasineutrality equations will be presented. References: [1] X.S. Lee, J.R. Myra, and Peter J. Catto, Phys. Fluids **26** (1), 1983, 223-229.

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