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Electrostatic turbulence on transport time scales[1] PETER CATTO, MIT Plasma Science & Fusion Center, ANDREI SIMAKOV, Los Alamos National Lab, FELIX PARRA, GRIGORY KAGAN, MIT Plasma Science & Fusion Center, MIT PLASMA SCIENCE & FUSION CENTER COLLABORATION, LOS ALAMOS NATIONAL LAB COLLABORATION — Simulating electrostatic turbulence on transport time scales requires retaining a complete turbulence modified neoclassical (and classical) transport description, including all the axisymmetric radial neoclassical and zonal flow electric field effects, as well as the turbulent transport normally associated with drift instabilities. Neoclassical electric field effects are particularly difficult to retain since they require evaluating the ion distribution function to higher order in gyroradius over background scale length than standard gyrokinetic treatments. To avoid extending gyrokinetics an alternate hybrid gyrokinetic-fluid treatment is formulated that employs higher order moments of the full Fokker-Planck equation to remove the need for a higher order gyrokinetic distribution function. The resulting hybrid description is able to model all electrostatic turbulence effects with wavelengths much longer than an electron Larmor radius such as the ion temperature gradient (ITG) and trapped electron modes (TEM).

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