

Abstract Submitted  
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**Multiphysics/Multiscale Coupling of Microturbulence and MHD Equilibria**<sup>1</sup> W.W. LEE, E.A. STARTSEV, S.R. HUDSON, W.X. WANG, S. ETHIER, Princeton Plasma Physics Laboratory, Princeton, NJ — We propose to investigate the multiphysics and multiscale coupling between a time-dependent gyrokinetic “microscopic” code for studying gyroradius-scale turbulence, associated with global ion-acoustic and shear-Alfven waves, and a “macroscopic” code for computing large-scale global equilibria based on the time-independent MHD equations, in order to identify a family of self-consistent global MHD equilibria that can minimize the electrostatic potentials responsible for turbulent transport by passing global parameters between the two codes. The codes involved are 1) the electromagnetic version [1] of the GTS code [2] for studying microturbulence, and 2) the SPEC code [3] for calculating three-dimensional MHD equilibria with or without chaotic fields. This concept is based on a newly found correlation between the gyrokinetic evolution and the MHD equilibrium when the electrostatic potential vanishes [4]. The proposed work involves the scales ranging from the electron skin depth to the machine size, and includes the physics of both gyrokinetics and MHD.

[1] E. A. Startsev et al., Sherwood Conference, New York (2015).

[2] W. X. Wang et al., Phys. Plasmas 13, 092525 (2006).

[3] S. R. Hudson et al., Phys. Plasmas 19, 112502 (2012).

[4] W. W. Lee, Sherwood Conference, New York (2015).

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