DPP15-2015-000425

Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Sorting Category: 6.2 (T)

Multiphysics/Multiscale Coupling of Microturbulence and MHD Equiliria[1] 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).

[1]This work is supported by US DoE DE-AC02-09CH11466

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Date submitted: 21 Jul 2015 Electronic form version 1.4