

22nd International Conference on Numerical Simulations of Plasma
Long Branch, NJ, Sept 7-9, 2011

Session: Space and Astrophysical Plasmas

Initial MHD Simulations of Accretion Disk with Zeus Code

M. H. Redi*, PPPL and J. Gu**, PPPL

Transport of plasma particles and energy from tokamaks and stellarators has been studied with gyrokinetic microstability computations of the ion temperature gradient and electron temperature gradient modes [1, 2]. This has been found to show satisfactory agreement with experiments on Alcator C-MOD at MIT and on NSTX at PPPL and holds promise for useful predictions for the performance of ITER. It is also of interest to study the transport of angular momentum in astrophysical plasmas and the nature of transport within accretion disks. We use the Zeus code [3] for initial simulations and plan to investigate an accretion disk with a shearing box model to explore MHD features of turbulence in comparison with hydrodynamical turbulence. Work is carried out on the Princeton Beowulf cluster in a restricted, two-dimensional geometry. The project is in initial stages and is planned to move toward full turbulent simulations of the magnetorotational instability.

* DoE Contract support: DE-AC02-09C411466

** PPPL Summer Intern Program.

[1] M. H. Redi, W. Dorland, et al., *Physics of Plasmas* 7 (2005).

[2] M. H. Redi, C. L. Fiore, et al., 31th European Physical Society Conference on Plasma Physics and Controlled Fusion, London, UK, June, 2004, P-2.163.

[3] James M. Stone, Michael L. Norman; *Astrophysical Journal Supplement Series* (ISSN 0067-0049), vol. 80, no. 2, June 1992, p. 753-790.

poster presentation