Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Linear gyrokinetic studies in NCSX, W7-AS, and W7-X stellarators using GS2 J.A. BAUMGAERTEL, W. GUTTENFELDER, G.W. HAMMETT, D.R. MIKKELSEN, Princeton Plasma Physics Laboratory, P. XANTHOPOULOS, J. GEIGER, Max Planck Institute for Plasma Physics, Greifswald, W. DORLAND, University of Maryland, College Park, E. BELLI, General Atomics — The GS2 gyrokinetic code is being used to study microinstabilities and turbulence in non-axisymmetric flux-tube geometries. Non-axisymmetric systems, such as stellarators, have a number of interesting features, like natural reversed magnetic shear and a large number of shaping parameters. These offer possibilities for reducing microturbulence and improving performance. The NCSX, W7-AS, and W7-X designs were partially optimized for neoclassical transport; however, the turbulent transport has not been studied in detail. We will present studies of gyrokinetic instabilities in NCSX and W7-X equilibria, including important geometry and linear benchmarks between GS2 and GENE, a gyrokinetic code from IPP. Specifically, we have investigated effects of plasma beta and magnetic shear on linear instabilities in NCSX geometry. In addition, we have conducted studies of the microstability of realistic W7-AS plasmas. Finally, we will discuss improvements to the GS2 trapped particle treatment and a new computational grid generator for GS2. This work was supported by the SciDAC Center for the Study of Plasma Microturbulence and Department of Energy Contract DE-AC02-09CH11466.

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Date submitted: 06 Jan 2012 Electronic form version 1.4