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Simulating the Effects of Stellarator Geometry on Gyrokinetic Instabilities with the GS2 Code J.A. BAUMGAERTEL, Los Alamos National Laboratory, W. GUTTENFELDER, G.W. HAMMETT, D.R. MIKKELSEN, Princeton Plasma Physics Laboratory, P. XANTHOPOULOS, J. GEIGER, Max Planck Institute for Plasma Physics, Greifswald, M. NUNAMI, National Institute for Fusion Science, W. DORLAND, University of Maryland, College Park, E. BELLI, General Atomics — The gyrokinetic turbulence code, GS2, has been adapted to handle stellarator geometry. Herein a new computational grid generator and upgrades to GS2 itself are described and benchmarked with GENE and GKV-X. Additionally, detailed linear studies using the National Compact Stellarator Experiment (NCSX) geometry are discussed, in particular those comparing stability in two equilibria with different β and those comparing NCSX linear stability to a tokamak case. Finally, a comparison of linear stability of two locations in a Wendelstein 7-AS (W7-AS) plasma is presented. The experimentally-measured parameters used were from a W7-AS shot in which measured heat fluxes were too large for neoclassical predictions at both radii. Results from GS2 linear simulations show that the outer location has higher gyrokinetic instability growth rates than the inner one. Mixing-length estimates of the heat flux are within a factor of 3 of the experimental measurements, indicating that gyrokinetic turbulence may be responsible for the higher transport measured by the experiment in the outer regions. 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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