Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Global microinstabilities in stellarators with radial electric field MICHAEL COLE, Princeton Plasma Physics Laboratory, TOSEO MORITAKA, National Institute for Fusion Studies, Japan, DAVID GATES, ROBERT HAGER, CHOONG-SEOCK CHANG, Princeton Plasma Physics Laboratory — Recent experimental results have shown that heat loss in optimized stellarators can be dominated by turbulent transport. The global gyrokinetic code XGC has been extended to model this physics, in analogy to extensive gyrokinetic studies of turbulence in tokamaks. Unlike in tokamaks, the radial electric field, set by neoclassical transport, is a key factor for predicting turbulence. For example, mode localisation, which is observed to be strong in many optimized stellarators, can be drastically altered by the radial electric field. The position of the mode, when combined with geometric properties such as the curvature, can be key in determining linear growth rates and, we suggest, saturated turbulence amplitudes. The XGC code has been extended to include such effects, capable of taking analytical estimates for the radial electric field as well data produced by self-consistent calculations with neoclassical transport codes. XGC takes stellarator geometry information from the VMEC or HINT3D codes. In this presentation, we show how the inclusion of the radial electric field modifies earlier simulations of microinstabilities in stellarators. Simulations of LHD-like configurations will be compared to a quasi-axisymmetric configuration.

Michael Cole
Princeton Plasma Physics Laboratory

Date submitted: 29 Jun 2020 Electronic form version 1.4