Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Gyrokinetic Formulation of Zonal Flow Momentum Conservation in Drift Wave Turbulence L.T. KATT, P.H. DIAMOND, University of California, San Diego, T.S. HAHM, Princeton University, Plasma Physics Laboratory, O.D. GURCAN, X. GARBET, CEA Cadarache — A fully gyrokinetic formulation of a generalized Charney-Drazin theorem for zonal flow momentum evolution is presented. The theorem is based on the intrinsically symplectic structure of the gyrokinetic equation and the GK Poisson equation, which parallels the structure of the quasi-geostrophic potential vorticity equation and the Taylor identity. This approach naturally identifies a phase space wave activity density, the evolution of which is tied to zonal momentum evolution. The constraints on zonal flow evolution in a stationary state are identified. This analysis focuses on a reduced model formulated by Kadomtsev and Pogutse and Darmet, et al., but is generalizeable. This material is based upon work supported by the Department of Energy under Award Numbers DE-FG02-04ER54738 and DE-FC02-08ER54959.

Patrick Diamond
University of California, San Diego

Date submitted: 14 Jul 2008 Electronic form version 1.4