Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Sources and Sinks in the Zonal Flow Energy Balance in Tokamak Microturbulence[1] ANDRIS DIMITS, WILLIAM NEVINS, DANA SHUMAKER, Lawrence Livermore National Laboratory — The relative contributions of various terms to the driving and damping of the zonal flows in toroidal ion temperature gradient turbulence are investigated using nonlinear gyrokinetic simulations. The simulation diagnostic was discussed and its correctness, in that the implemented terms numerically recover the net rate of change of the zonal flows, was demonstrated previously (A.M. Dimits et al. APS-DPP02 meeting). Application of this diagnostic to gyrokinetic ITG simulations in the turbulent finite-transport regime shows that zonal flow energy is generated primarily through the Reynolds' stress term and dissipated by the transit time damping terms. The source and sink rates of other terms, such as the diamagnetic Reynolds stress, are finite but lower. The effect of sampling the fields at a small number of positions vs. full flux-surface averaging, relevant to the applicability of such a diagnostic to experiments, is addressed.

[1]Work performed for USDOE by Univ. California LLNL under contract W-7405-ENG-48.

Andris Dimits
Lawrence Livermore National Laboratory

Date submitted: 22 Jul 2005 Electronic form version 1.4