Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Kinetic particle simulation of turbulence in an FRC geometry DANIEL FULTON, CALVIN LAU, IHOR HOLOD, ZHIHONG LIN, University of California, Irvine, SEAN DETTRICK, MICHL BINDERBAUER, TriAlpha Energy, TOSHIKI TAJIMA, University of California, Irvine, and TriAlpha Energy — Core turbulence in a Field Reversed Configuration (FRC) is studied using the Gyrokinetic Toroidal Code with modified equilibrium geometry. The code solves the gyrokinetic equation for ions and the drift kinetic equation for electrons. The simulation region is an annulus which excludes plasma near the O-point to avoid breakdown of the gyrokinetic dynamics of ions. The C-2 FRC equilibrium is introduced to study similar conditions as found in the C-2 experiments, where the core is found to be relatively quiescent. In simulation, we find the C-2 plasma is stable to ion temperature gradient instabilities using realistic experimental parameters, consistent with experimental results obtained in C-2. When temperature and density gradients are enhanced beyond typical C-2 parameters, we observe a class of instabilities that appear as flute-like drift modes. These results shed light on a possible reason why transport temperature scaling in the C-2 core is radically different from that of typical turbulent transport scaling such as the Bohm-like regime. Progress is also reported on simulations of scrape off layer turbulence and electron driven turbulence.

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Date submitted: 11 Jul 2014 Electronic form version 1.4