Abstract Submitted for the 54th Annual Meeting
Division of Plasma Physics
October 29 through November 2, 2012
Providence, Rhode Island

Category Number and Subject: 5.6.2. DIII-D Tokamak

[X] Theory [ ] Experiment

Gyrokinetic Simulation of Global and Local Alfvén Eigenmodes Driven by Neutral Beam Injection in DIII-D,* E.M. Bass, *UCSD*; R.E. Waltz, *GA* – In ITER, convection of fusion-produced alpha particles by energetic particle (EP)-driven Alfvén eigenmodes (AEs) risks both wall damage and loss of alpha heating needed for ignition. We examine beam-excited AEs and induced quasilinear transport in a DIII-D AE experiment using the gyrokinetic code GYRO [1]. Global, linear eigenvalue simulations show reverse-shear Alfvén eigenmodes (RSAEs), toroidal Alfvén eigenmodes, and beta-induced Alfvén eigenmodes interacting over one (equilibrium time scale) RSAE frequency sweep. Eigenfunction modifications over MHD, including a poloidal twist and broad AE footprint observed in electron cyclotron emission imaging [2], show the value of a kinetic approach. Under a simple quasilinear saturation assumption, a sequence of comparatively inexpensive local simulations quantitatively recreates some global features, notably the quasilinear transport footprint. Accordingly, we present here a stiff EP transport model where AEs limit the EP density gradient to the local stability threshold, and a TGLF-driven quasilinear model elsewhere. The model gives some "worst case" predictions of the AE-limited alpha profile in ITER.

[1] J. Candy and R.E. Waltz, Phys. Rev. Lett. **91**, 045001 (2003).
[2] B.J. Tobias, *et al.,* Phys. Rev. Lett. **106**, 075003 (2011).

*Work supported by the US Department of Energy under DE-FG02-95ER54309 and DE-FC02-08ER54977.