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Gyrokinetic Simulation of Global and Local Alfvén Eigenmodes Driven by Neutral Beam Injection in DIII-D[1] E.M. BASS, UCCSD, R.E. WALTZ, GA — In ITER, convection of fusion-produced alpha particles by energetic particle (EP)-driven Alfvén eigenmodes (AEs) risks 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 AEs (RSAEs), toroidal AEs, and beta-induced AEs 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).

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