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Transport of Fusion Alpha Particles in ITER Scenarios*

E.M. Bass *UCSD* and R.E. Waltz *GA* — An integrated 1D transport model for energetic particles [1] is applied to predict the fusion-born alpha particle density profile in various ITER scenarios. The model combines "stiff" critical gradient alpha-driven Alfvén eigenmode (AE) transport with a quasilinear approximation of microturbulent transport [2]. In an ITER baseline case [3], transport by unstable AEs is found to redistribute alphas within the core but does not propagate to the loss boundary. When AE transport remains in the core, the remaining microturbulent effect causes negligible edge energy flux in the alpha channel (ripple loss is neglected here). We apply the model with the AE stiff transport critical gradient threshold set at $g_{AE}=g_{ITG}$, below which ion temperature gradient microturbulence can nonlinearly suppress AE transport [4], and the more stringent condition $g_{AE}=0$. We report results for hybrid current drive and steady-state (with reverse shear) ITER discharges.

[1] R.E. Waltz and E.M. Bass, "Prediction of the fusion alpha density profile in ITER from local marginal stability to Alfven eigenmodes", accepted for Nucl. Fusion
[2] C. Angioni et al., Nucl. Fusion **49**, 055013 (2009)
[3] J.E. Kinsey et al., Nucl. Fusion **51** 083001 (2011)
[4] E.M. Bass and R.E. Waltz, Phys. Plasmas **17**, 112319 (2010)

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