Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Microtearing instabilities and resulting electron thermal transport in DIII-D discharges[1] A.H. KRITZ, T. RAFIQ, Lehigh U., USA, L. LUO, IBM Research, USA, J. WEILAND, Chalmers U., Sweden — A reduced transport model for microtearing modes (MTMs), has been developed for use in integrated predictive modeling studies. A unified fluid/kinetic approach is employed in the derivation of the nonlinear MTM dispersion relation. The dependence of the MTMs real frequency and growth rate in DIII-D like L-mode and H-mode plasma discharges is examined for a range of plasma parameters. The saturated amplitude of the magnetic fluctuations is calculated utilizing numerically determined MTM eigenvalues in the nonlinear MTM envelope equation. It is found that the electron temperature gradient in the presence of moderate collision frequency is required for MTMs to become unstable. The effects of small and large collisionality and small and large wavenumbers on MTMs are found to be stabilizing, while the effects of density gradient, plasma beta, low current density, and large magnetic shear are found to be destabilizing. The MTM growth rate, magnetic fluctuation strength, as well as electron thermal diffusivity is found to be larger in the H-mode plasma than in the L-mode plasma.

[1]Research supported in part by the U.S. DOE, Office of Science.

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Date submitted: 18 Jul 2017 Electronic form version 1.4