Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Linear instabilities near the DIII-D edge simulated in fluid models[1] ERIC BASS, CHRISTOPHER HOLLAND, UC San Diego — The linear instability spectrum is reported near the DIII-D edge (within the separatrix) for L-mode and H-mode shots using the new eigenvalue solver FluTES (Fluid Toroidal Eigenvalue Solver). FluTES circumvents difficulties with convergence to clean linear eigenmodes (required for diagnosis of nonlinear simulations in codes such as BOUT++ [1]) often encountered with fluid initial-value solvers. FluTES is well-verified in analytic cases and against a BOUT++/ELITE benchmark toroidal case. We report results for both a 3-field, one-fluid model (the well-known elm-pb model) and a 5-field, two-fluid model. For the peeling-ballooning-dominated H-mode, the two solutions are qualitatively the same. In the driftwave-dominated L-mode edge, only the two-fluid solution gives robust instabilities which occur primarily at $n > 50$. FluTES is optimized for this regime (near-flutelike limit, toroidally spectral). Cross-separatrix, coupled fluid and drift instabilities may play a role in explaining the gyrokinetic L-mode edge transport shortfall [2]. Extension of FluTES into the open-field-line region is underway. [1] Dudson et al., Comp. Phys. Comm. V.180 (2009) 1467. [2] C. Holland et al, Phys. Plasmas 16, 052301 (2009).

[1]Prepared by UCSD under contract number DE-FG02-06ER54871.

Eric Bass
UC San Diego

Date submitted: 13 Jul 2017 Electronic form version 1.4