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Linear instability regimes in L-mode edges using reduced MHD models in BOUT++[1] ERIC BASS, CHRIS HOLLAND, Univ of California - San Diego, BRUCE COHEN, MAXIM UMANSKY, Lawrence Livermore National Laboratory — We compare linear instabilities in the edge of two DIII-D L-mode discharges using reduced two-fluid MHD models implemented in BOUT++ [1]. Discharge 119919, a case used in a previous BOUT++ validation study [2], has a cold edge and is dominated by resistive ballooning modes (RBMs). Hotter discharge 128913, an L-mode shortfall benchmark case [3], is drift-wave (DW) dominant. The model captures essential drift wave physics through the electron pressure parallel gradient drive term in the $A_{||}$ evolution. At relevant toroidal mode numbers (50-200), the leading DWs in 128913 are flutelike with high k_r and require about an order of magnitude greater radial resolution than the leading RBMs in 119919. We quantify when such high k_r modes must be resolved in practice. To aid eigenfunction confirmation, and to identify potential subdominant DWs, a companion eigenvalue solver for the BOUT++ models is under development. [1] Dudson et al., Comp. Phys. Comm. V.180 (2009) 1467. [2] B. I. Cohen et al., Phys. Plasmas **20**, 055906 (2013) [3] C. Holland et al, Phys. Plasmas **16**, 052301 (2009) [4] J. Candy and R.E. Waltz J. Comput. Phys. 186, 545 (2003) * Prepared by UCSD under contract number DE-FG02-06ER54871.

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