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Computational analysis of two-fluid edge plasma stability in tokamak geometries TOM NEISER, UCLA, DEREK BAVER, Lodestar, TROY CARTER, UCLA, JIM MYRA, Lodestar, PHIL SNYDER, General Atomics, MAXIM UMANSKY, LLNL — In H-mode, the edge pressure gradient is disrupted quasi-periodically by Edge Localized Modes (ELMs), which leads to confinement loss and places large heat loads on the divertor. This poster gives an overview of the peeling-ballooning model [1] for ELM formation and presents recent results of 2DX, a fast eigenvalue code capable of solving equations of any fluid model [2]. We use 2DX to solve reduced ideal MHD equations of two-fluid plasma in the R-Z plane, with toroidal mode number resolving the third dimension. Previously, 2DX has been successfully benchmarked against ELITE and BOUT++ for ballooning dominated cases in simple shifted circle geometries [3-4]. We present follow-up work in simple geometry as well as similar benchmarks for full X-point geometry of DIII-D. We demonstrate 2DX's capability as computational tool that supports nonlinear codes with linear verification and as experimental tool to identify density limits, map the spatial distribution of eigenmodes and investigate marginal stability of the edge region.

[1] P.B. Snyder et al., Phys. Plasmas 9, 2037 (2002)
[2] D.A. Baver et al., Comp. Phys. Comm. 182, 1610 (2011)
[3] B.D. Dudson et al., Comp. Phys. Comm. 180, 1467 (2009)
[4] www.lodestar.com/research/vnv/

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