ELM modeling using the 2DX eigenvalue code

D. A. Baver,[a)] J. R. Myra,[a)] M. V. Umansky[b)]

a) Lodestar Research Corporation

b) Lawrence Livermore National Laboratory

Edge-localized modes (ELM's) are studied with the 2DX code, which is a flexible eigenmode solver designed for toroidal plasma configurations with an x-point topology.

Both high resolution and short run times are readily achievable with 2DX, which employs state-of-the-art eigensolving techniques through the SLEPc sparse matrix package[1]. In addition, its use of a specialized equation parser allows for rapid customization and alteration of model equations. This equation parser also permits implementation of gyrofluid models and iterative approximation of kinetic effects.

These capabilities make 2DX a useful tool for applications to experimental situations where the linear physics is important, in particular the linear stability of the peeling-ballooning (PB) mode generally believed to be the cause of ELM's.

We consider a PB mode case in a shifted circle geometry, using the physics model of high-beta ideal reduced MHD equations. Growth rates and eigenmodes from 2DX calculations are compared with the previously benchmarked results from ELITE and BOUT++[2].

[1] http://www.grycap.upv.es/slepc/

[2] B. D. Dudson *et al*, Comp. Phys. Comm. 180 (2009) 1467.

Work supported by the U.S. DOE under grant DE-FG02-07ER84718.