Abstract Submitted
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Algorithmic Issues and Applications of BOUT++ to Simulation of Realistic Tokamak Configurations[1] BRUCE COHEN, MAXIM UMANSKY, MICHAEL MAKOWSKI, Lawrence Livermore National Laboratory — Progress is reported on simulations of electrostatic resistive ballooning instabilities in realistic tokamak geometries using the BOUT++ three-dimensional fluid code [1]. The simulations extend to include the open flux region and a single divertor with X-point, using the actual magnetic geometry of the DIII-D tokamak. Comparisons of the growth rates for linear instabilities are made to those from the 2DX linear code [2]. It is found that unphysical grid oscillations tend to emerge in the parallel coordinate at the shortest wavelength, and two methods are used to control it - inclusion of an artificial spatial diffusion operator or use of a staggered grid. Simulations of a nonlinear saturated state are presented along with initial comparison to experimental data from DIII-D.

[1] B. D. Dudson, et al., Computer Phys. Comm. **180**, 1467 (2009).
[2] D. A. Baver, J. R. Myra and M.V. Umansky, Computer Phys. Comm. **182**, 1610 (2011).

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