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Modeling Plasma Turbulence and Flows in LAPD using BOUT++ B. FRIEDMAN, T.A. CARTER, D. SCHAFFNER, P. POPOVICH, UCLA, M.V. UMANSKY, LLNL, B. DUDSON — A Braginskii fluid model of plasma turbulence in the BOUT code has recently been applied to LAPD at UCLA [1]. While these initial simulations with a reduced model and periodic axial boundary conditions have shown good agreement with measurements (e.g. power spectrum, correlation lengths), these simulations have lacked physics essential for modeling self-consistent, quantitatively correct flows. In particular, the model did not contain parallel plasma flow induced by sheath boundary conditions, and the axisymmetric radial electric field was not consistent with experiment. This work addresses these issues by extending the simulation model in the BOUT++ code [2], a more advanced version of BOUT. Specifically, end-plate sheath boundary conditions are added, as well as equations to evolve electron temperature and parallel ion velocity. Finally, various techniques are used to attempt to match the experimental electric potential profile, including fixing an equilibrium profile, fixing the radial boundaries, and adding an angular momentum source.

[1] Popovich et al., http://arxiv.org/abs/1005.2418 (2010).
[2] Dudson et al., *Computer Physics Communications 180* (2009).

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