Testing and Plans for the COGENT Edge Kinetic Code*

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The Edge Simulation Laboratory (ESL) is a multi-institutional collaboration to develop kinetic edge codes using continuum techniques. A new code, COGENT, based on fourth-order conservative finite-volume discretization of gyrokinetic equations, has been developed and is now undergoing testing. Initially the code is electrostatic, 4D (axisymmetric), with a Miller geometry (shaped tokamak core), but with the optional addition of a toroidal limiter to provide a scrape-off-layer region. As part of a campaign to verify COGENT, we have undertaken a series of simulations of geodesic acoustic modes (GAMs). Our results show remarkably good agreement with the theory of Gao et al [1], including capturing of a predicted dip in damping rate versus safety factor associated with the transition between damping at the fundamental and second harmonic resonances. We are in the process of upgrading the code to include collisions and divertor geometry, and discuss the progress of these activities as well as future plans.

[1] Zhe Gao, K. Itoh, H. Sanuki and J.Q. Dong, Phys. Plasmas **10**, 215001 (2008).