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BOUT Simulations of Edge Turbulence in the DIII-D Tokamak¹ BRUCE COHEN, MAXIM UMANSKY, WILLIAM NEVINS, MIKE MAKOWSKI, Lawrence Livermore National Laboratory, JOSE BOEDO, DMITRY RUDAKOV, CHRIS HOLLAND, Univ Calif San Diego, GEORGE MCKEE, ZHENG YAN, Univ. Wisconsin Madison — Progress is reported on simulations of electromagnetic drift-resistive ballooning turbulence in realistic single-null tokamak geometry using the BOUT three-dimensional fluid code [1] that solves Braginskii-based fluid equations [2]. The simulation domain models the actual magnetic geometry of the DIII-D tokamak. The simulations follow unstable drift-resistive ballooning turbulence in the edge region to saturation. Fluctuation amplitudes, fluctuation spectra, and particle and thermal fluxes are compared to experimental probe and beamemission-spectroscopy data for a well-characterized L-mode discharge in DIII-D. Post-processing of the simulation data using synthetic diagnostics facilitates the comparisons. The simulations are comprised of a suite of runs in which the physics model evolves to include more fluid fields and physics terms. The relative agreement of the simulation results with the experimental data improves as more physics is included.

[1] X. Q. Xu, and R. H. Cohen, Contrib. Plasma Phys. 36 (1998) 158.

[2] S. Braginskii, "Transport Processes in a Plasma," in Rev. Plas. Phys., Vol 1, ed.M. A. Leontovich (Consltnts. Bureau, New York, 1965), p. 205.

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