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Simulations of Turbulence in Tokamak Edge and Effects of Self-Consistent Zonal Flows* BRUCE COHEN, MAXIM UMANSKY, Lawrence Livermore National Laboratory — Progress is reported on simulations of electromagnetic drift-resistive ballooning turbulence in the tokamak edge. This extends previous work [1] to include self-consistent zonal flows and their effects. The previous work [1] addressed simulation of L-mode tokamak edge turbulence using the turbulence code BOUT that solves Braginskii-based plasma fluid equations in tokamak edge domain. The calculations use realistic single-null geometry and plasma parameters of the DIII-D tokamak and produce fluctuation amplitudes, fluctuation spectra, and particle and thermal fluxes that compare favorably to experimental data. In [1] the effect of sheared ExB poloidal rotation is included with an imposed static radial electric field fitted to experimental data. In the new work here we include the radial electric field self-consistently driven by the microturbulence, which contributes to the sheared ExB poloidal rotation (zonal flow generation). We present simulations with/without zonal flows for both cylindrical geometry, as in the UCLA Large Plasma Device, and for the DIII-D tokamak L-mode cases in [1] to quantify the influence of self-consistent zonal flows on the microturbulence and the concomitant transport. *This work was performed under the auspices of the U.S. Department of Energy under contract DE-AC52-07NA27344 at the Lawrence Livermore National Laboratory.

[1] B. I. Cohen et al., Phys. Plasmas **20**, 055906 (2013)

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