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Lattice Boltzmann Representation of Electrostatic Drift Wave Turbulence BO ZHANG, GEORGE VAHALA, William and Mary, LINDA VAHALA, Old Dominion University — Zonal flows are low frequency coherent structures that are generated by small scale drift wave turbulence, and in turn these flows can lead to a suppression in the turbulence and in anomalous transport. Recent work by Dewar et. al. on the Hasegawa-Wakatani model has found that density gradients build up the turbulent kinetic energy to a critical level which then leads to the onset of zonal flows and turbulence suppression. The Hasegawa-Wakatani mode extends the one-field Hasegawa-Mima theory to include the effects of electron motion along the toroidal magnetic field. Dewar et. al. note that zonal fluctuations do not contribute to the parallel current. There are 3 extensions need to standard Lattice Boltzmann (LB) methods to solve the Dewar model: Poisson brackets, Poisson equation, and hyperdiffusive operators. We have tested these three LB elements separately and benchmarked them against exact solutions. We discuss progress on the actual implementation of LB to electrostatic drift wave turbulence.

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