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Reduced simulations of boundary turbulence in NSTX[1] D.A. RUSSELL, J.R. MYRA, D.A. D'IPPOLITO, Lodestar Research Corporation, R. MAQUEDA, Nova Photonics, V. SOUKHANOVSKII, LLNL, S.J. ZWEBEN, PPPL, AND THE NSTX TEAM — We solve a reduced set of equations numerically for the evolution of vorticity, density, temperature and zonal fluid momentum, in the two dimensions orthogonal to the magnetic field, in the edge and SOL of a tokamak. In the simulation plane, the edge region supports the electron drift wave instability, while sheath losses and the grad-Te instability are isolated in the SOL. Curvature- and grad-B-driven charge separation is included everywhere, enabling blob transport of density, temperature and vorticity (charge) from the edge into the SOL. Generic features of boundary turbulence seen in NSTX and other experiments are reproduced by the simulations, including skewed PDFs, power law frequency spectra, skewness vs. distance from the separatrix, and qualitative features seen with Gas Puff Imaging. We will also report on our modeling of divertor disconnection/detachment experiments in NSTX for which blob speed-up and SOL-broadening are predicted theoretically.

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