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Turbulence and magnetic field generation by magnetic electron drift vortex modes in a nonuniform plasma[1] BENGT ELIASSON, PADMA K. SHUKLA, Theoretical Physics IV, Ruhr-University Bochum, Germany, VLADIMIR P. PAVLENKO, Department of Physics and Astronomy, Uppsala University, Sweden — We present a simulation study of the dynamical evolution of nonlinearly interacting two-dimensional magnetic electron drift vortex modes in a nonuniform plasma. Depending on the equilibrium density and temperature gradients, the system can either be stable or unstable. The unstable system reveals spontaneous generation of magnetic fields from noise level, and large-scale magnetic field structures are formed. When the system is linearly stable, one encounters magnetic electron drift vortex (MEDV) mode turbulence in which there is a competition between zonal flows and streamers. For large MEDV mode amplitudes, one encounters the formation of localized and small-scale magnetic vortices and vortex pairs with scale sizes of the order of the electron skin depth. The MEDV turbulence exhibits non-Kolmogorov and anisotropic spectra for different sets of plasma parameters.

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