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Whistler Turbulence: Particle-in-Cell Simulations S. PETER GARY, Los Alamos National Laboratory, SHINJI SAITO, Nagoya University, HUI LI, Los Alamos National Laboratory — Two dimensional electromagnetic particle-in-cell simulations in a magnetized, homogeneous, collisionless electron-proton plasma demonstrate the forward cascade of whistler turbulence. The simulations represent decaying turbulence, in which an initial, narrowband spectrum of fluctuations at $kc/\omega_e \simeq 0.1$ cascades toward increased damping at $kc/\omega_e \simeq 1.0$, where c/ω_e is the electron inertial length. The turbulence displays magnetic energy spectra that are relatively steep functions of wavenumber and are anisotropic with more energy in directions relatively perpendicular to the background magnetic field $\mathbf{B}_o = \hat{\mathbf{x}} B_o$ than at the same wavenumbers parallel to $\mathbf{B}_o$. In the weak turbulence regime, the simulations demonstrate that the cascading fluctuations have the following properties: 1) Magnetic spectra become more anisotropic with increasing fluctuation energy; 2) the wavevector dependence of the three magnetic energy ratios, $|\delta B_j|^2/|\delta \mathbf{B}|^2$ with $j = x, y, z$, show good agreement with linear dispersion theory for whistler fluctuations; 3) the magnetic compressibility summed over the cascading modes satisfies $0.3 < |\delta B_x|^2/|\delta \mathbf{B}|^2 < 0.6$; and 4) the turbulence heats electrons in directions both parallel and perpendicular to $\mathbf{B}_o$, with stronger heating in the parallel direction.

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