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Laboratory investigation of nonlinear whistler wave processes[1]
BILL AMATUCCI, ERIK TEJERO, CHRIS CRABTREE, LON ENLOE, DAVE BLACKWELL, GURU GANGULI, Naval Research Laboratory — Nonlinear interactions involving whistler wave turbulence result from processes such as wave-particle interactions in the radiation belts and instability generation in sharp magnetospheric boundary layers. Nonlinear scattering of large amplitude waves off thermal electrons substantially changes the wave vector direction and energy flux, while inducing a small frequency shift [*Crabtree*, *Phys. Plasmas* **19**, 032903 (2012)]. This nonlinear scattering of primarily electrostatic lower hybrid waves into electromagnetic whistler modes is being investigated in the NRL Space Chamber under conditions scaled to match the respective environments. Lower hybrid waves are generated directly by antennas or self-consistently from sheared cross-magnetic field flows with scale length less than an ion gyroradius via the Electron-Ion Hybrid Instability [*Ganguli*, *Phys. Fluids* **31**, 2753 (1988)), *Amatucci*, *Phys. Plasmas* **10**, 1963 (2003)]. Sufficiently large amplitude lower hybrid waves have been observed to convert into whistler modes by scattering from thermal electrons. The plasma response as a function of transmitted lower hybrid wave amplitude is monitored with magnetic loop antennas. Details of the observed wave spectra and mode characteristics will be presented.

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