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Laboratory investigation of nonlinear whistler wave processes[1]
B. AMATUCCI, E. TEJERO, Naval Research Laboratory, C. COTHRAN, Sotera Defense Solutions, G. GANGULI, C. CRABTREE, M. MITHIAWALA, Naval Research Laboratory, V. SOTNIKOV, Air Force Research Laboratory — Nonlinear interactions involving whistler wave turbulence result from processes, including wave-particle interactions and instabilities in sharp boundary layers. Given sufficient whistler energy density, nonlinear scattering off thermal electrons substantially changes the wave vector direction and energy flux, while inducing a small frequency shift.[2] In the magnetosphere, boundary layers often have highly sheared plasma flows and lower hybrid turbulence. Such nonlinear processes are being investigated in the NRL Space Chamber in conditions scaled to match the respective environments. By creating boundary layers with controllable density gradient and transverse electric fields and scale length much smaller than an ion gyroradius, lower hybrid waves consistent with the Electron-Ion Hybrid Instability[3] have been observed. Sufficiently large amplitude lower hybrid waves have been observed to scatter into whistler modes by scattering from thermal electrons. The plasma response as a function of transmitted lower hybrid wave amplitude is monitored with magnetic antennas. Details of the observed wave spectra and mode characteristics will be presented.

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[2]Crabtree *et al.*, *Phys. Plasmas*, **19**, Art. No. 032903 (2012).
[3]Ganguli *et al.*, *Phys. Fluids*, **31**, 2753 (1988).

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