Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Whistler Anisotropy Instability in the Magnetosphere: Linear Theory and Particle-in-Cell Simulations S. PETER GARY, KAIJUN LIU, DAN WINSKE, Los Alamos National Laboratory — Linear kinetic dispersion theory and two-dimensional particle-in-cell simulations have been carried out for the whistler anisotropy instability driven by the electron temperature anisotropy $T_{\perp e}/T_{\parallel e} > 1$. If the ratio of the electron plasma frequency to the electron cyclotron frequency is greater than unity and $\beta_{\parallel e} \geq 0.025$, the maximum growth rate of the whistler anisotropy instability is at propagation parallel to the background magnetic field $\mathbf{B}_o$ and the fluctuating fields are substantially electromagnetic. At smaller values of $\beta_{\parallel e}$, the maximum growth rate shifts to propagation oblique to $\mathbf{B}_o$, and the fluctuating electric fields become primarily electrostatic. If the electron velocity distribution can be described as the sum of two anisotropic components with different parallel temperatures, simulations show that each component drives the growth of a distinct, independent whistler instability. For typical magnetospheric parameters, this configuration gives rise to two distinct frequency bands of enhanced fluctuations, similar to the banded chorus often observed in the magnetosphere.

S. Peter Gary
Los Alamos National Laboratory

Date submitted: 06 Jul 2011 Electronic form version 1.4