Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Instability of coherent whistlers propagating along field lines in the magnetosphere[1] MARTIN LAMPE, GURUDAS GANGULI, NRL Plasma Phys. Div., GLENN JOYCE, WALLACE MANHEIMER, U. Maryland — We report on analytic and simulation studies of nonlinear instability triggered by a whistler propagating along a geomagnetic field line. For simplicity of interpretation, the electron distribution is taken to be the highly unstable ring distribution $f(\mathbf{v})=\delta(v_{||}-v_{||0})\delta(v_{\perp}-v_{\perp 0})$. The variation (quadratic near the equator) of the geomagnetic field B(z) along a field line is important, even though $\lambda \sim 1$ km while the field gradient scale $\sim$1000 km. The instability is triggered by an initial wave pulse of finite duration τ_p; the value of τ_p also plays an important role. Instability occurs initially at the resonant points where $\omega - kv_{||} - \Omega = 0$, but is carried backwards in the pulse by the stream of resonant electrons. The fresh flow of unperturbed electrons into the pulse plays an important role, and in the non-uniform B(z), phase-trapped electrons can continue to drive the nonlinear stage of the instability, which is characterized by both growth and strong spatio-temporal variations of the wave frequency.

[1]Supported by ONR

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Date submitted: 18 Jul 2007