

Abstract Submitted
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Triggering, nonlinear amplification and absolute instability of whistlers of whistlers¹ MARTIN LAMPE, GURUDAS GANGULI, Naval Research Laboratory, GLENN JOYCE, WALLACE MANHEIMER, University of Maryland — We consider the instability of a whistler wave packet propagating from north to south along a geomagnetic field line, in the presence of a cold plasma backgrounds as well as a distribution of high energy electrons. For simplicity of analysis, we first consider the case of a ring distribution of high energy electrons, moving from south to north. We present simulations and analysis showing that instability begins at two locations, symmetrically located in the northern and southern hemispheres, where the electrons are cyclotron resonant with the wave. After trapping sets in, nonlinear growth continues, due to the geomagnetic field gradient, only in the southern hemisphere. The stream of resonant electrons which has passed through, and become modulated at the resonant point, drives new waves at a lower frequency which is locally resonant with the electrons, permitting growth all the way from the linearly resonant point to the equator. Due to these wake electrons, the wave grows in the opposite direction to linear wave propagation, leading to an absolute instability. We find that a similar effect occurs for the more physical case of an electron distribution function that has step discontinuities.

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