Abstract Submitted
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Effects of Induced Scattering of Lower-Hybrid Waves by Plasma Particles on the Lifetime of Plasma-sheet Turbulence[1] MANISH MITHAIWALA, Naval Research Laboratory, LEONID RUDAKOV, Icarus Research Inc., GURUDAS GANGULI, CHRIS CRABTREE, Naval Research Laboratory — The portion of broadband electrostatic turbulence in the plasma sheet consisting of lower-hybrid waves is thought to be generated by proton-ring distributions [1]. However it remains a mystery why these ring distributions are so long lived. The possibility that induced non-linear scattering of lower-hybrid waves from plasma electrons to longer wavelengths has been considered as a saturation mechanism for these instabilities, which saturate the wave amplitude at very low levels, allowing the ion-ring distributions to be long-lived. This was demonstrated theoretically, as well as in 3D simulations [2, 3]. A comparison of the electric field fluctuation amplitude at two different values of plasma beta confirms that the saturation amplitude depends on temperature. This is consistent with nonlinear scattering by particles being the dominant nonlinearity rather than three-wave interaction. Though it has been shown previously that it is inappropriate to the treat the nonlinear scattering of lower-hybrid waves only in the electrostatic limit, the suggested electromagnetic generalizations only included changes to the nonlinear charge density. Thus a self-consistent treatment that includes both a nonlinear charge and current density is shown here. [1] Huba, J. D., J. Chen, and R. R. Anderson (1992), J. Geophys. Res., 97(A2), 1533–1540 [2] Winske and Daughton [Phys Plasmas, 19, 072109, 2012 [3] L. Rudakov, C. Crabtree, M. Mithaiwala, and G. Ganguli, Arxiv 2012

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