



Wave “Coherency” and Implications for Wave-Particle Interactions

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Wave “coherency” was introduced in 2009 by Tsurutani et al. (JGR, doi:10.1029/2008JA013353, 2009) to describe the waves detected in the ~ 10 to 100 ms duration subelements which are the fundamental components of ~ 0.1 to 0.5 s chorus “elements”. In this talk we will show examples of what we mean by coherency and quasicoherecy for: electromagnetic whistler mode chorus, electromagnetic ion cyclotron waves and plasmaspheric hiss waves. We will show how to measure coherency/quasicoherecy quantitatively. This will be important for modeling purposes. Perhaps even more important is how coherent waves affect wave-particle interactions. Specific wave examples will be used to show that the pitch angle scattering rate for energetic electrons is roughly 3 orders of magnitude faster than Kennel-Petschek diffusion (which assumes incoherent waves).