

Particle simulation of rising tone emissions triggered by waves with different amplitudes

Mitsuru Hikishima[1]; Yoshiharu Omura[2]

[1] JAXA; [2] RISH, Kyoto Univ.

Self consistent electromagnetic particle simulations are performed to analyze whistler mode triggered emissions in the magnetosphere. Triggering whistler mode waves injected at the magnetic equator induce a nonlinear absolute instability that results in rising tone emissions [1]. We performed the simulations with different triggering wave amplitudes to examine characteristics of the triggered emissions. The triggering waves with greater amplitudes than the threshold for the nonlinear wave growth [2] induce the rising triggered emissions. The fine structures of waveforms are obtained in detailed time resolution for the triggered emissions. The time evolutions of amplitudes and frequencies show that the frequency sweep rates do not vary even different triggering wave amplitudes. The amplitudes of the triggering waves satisfy the optimum amplitude condition for which rising triggered emissions can attain the maximum wave growth [3]. The phase-organized resonant electrons clearly appear in velocity phase space, contributing the nonlinear wave growth. We show that the frequency sweep rate and the maximum wave amplitude of triggered emissions do not depend on triggering wave amplitude.

[1] Hikishima, M., Y. Omura, and D. Summers (2010), Self consistent particle simulation of whistler mode triggered emissions, *J. Geophys. Res.*, 115, A12246, doi:10.1029/2010JA015860.

[2] Omura, Y., M. Hikishima, Y. Katoh, D. Summers, and S. Yagitani (2009), Nonlinear mechanisms of lower band and upper band VLF chorus emissions in the magnetosphere, *J. Geophys. Res.*, 114, A07217, doi:10.1029/2009JA014206.

[3] Omura, Y., and D. Nunn (2011), Triggering process of whistler mode chorus emissions in the magnetosphere, *J. Geophys. Res.*, 116, A05205, doi:10.1029/2010JA016280.