ULF wave modulation on the generation process of whistler-mode chorus emissions

*Yuto Katoh[1], Chen Lunjin[2]

1. Graduate School of Science, Tohoku University, 2. University of Texas at Dallas

We study the modulation of the generation process of whistler-mode chorus emissions under the presence of ULF waves in the inner magnetosphere. Previous studies revealed properties of chorus generation depending on the number density of energetic electrons, temperature anisotropy of velocity distribution function, and spatial gradient of the background magnetic field [Katoh and Omura, 2011, 2013, 2017]. The properties of both energetic electrons and the background magnetic field are also varied by the presence of ULF waves in the inner magnetosphere [e.g., Xia et al., 2016]. The range of parameters controlling chorus generation should be examined by a self-consistent simulation reproducing the generation process of chorus emissions. By referring the range of variations of the background magnetic field for toroidal and poloidal mode ULF waves, we carry out a series of electron hybrid code simulations, changing number density and temperature anisotropy of energetic electrons. Simulation results clarify that the variation of the spatial gradient of the background magnetic field controls whether or not distinct chorus emissions are generated from the magnetic equator. The results of the present study serve useful information in understanding in-situ observation of both chorus and ULF waves and related wave-particle interactions occurring in the inner magnetosphere.

Keywords: whistler-mode chorus, wave-particle interaction, numerical experiments

