

Title : Computer Simulations of Waves in Space Plasmas**Speaker : Yoshiharu Omura** (RISH, Kyoto University)**Related RISH mission : Mission 3****Abstract :**

Various types of electromagnetic and electrostatic waves are observed in the space environment surrounding the Earth. These waves are excited through interactions between coherent waves and energetic particles in space plasmas. Electromagnetic particle simulations have been conducted, reproducing the generation processes of whistler-mode chorus wave emissions, electromagnetic ion cyclotron (EMIC) wave emissions, and electrostatic solitary waves (ESW). Whistler-mode chorus emissions and EMIC emissions are characterized by peculiar frequency variations (Figure 1), and they are responsible for formation and precipitation of relativistic electrons in the Earth's outer radiation belt, which can be hazardous to activities of human beings in the geo-space environment. ESW are observed in various regions of the magnetosphere, indicating occurrence of strong wave-particle interactions such as two-stream instabilities due to mixing of different groups of energetic particles (Figure 2) in boundary layers. A brief review of the nonlinear physical processes of wave generation and particle acceleration and scattering that have been clarified by computer simulations will be given.

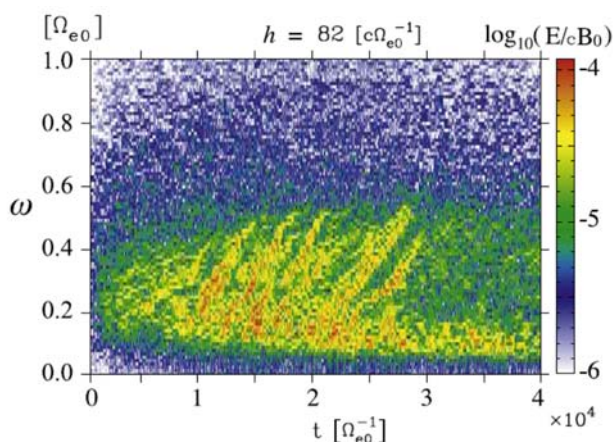


Figure 1: Whistler-mode Chorus Emissions
[Omura and Katoh, JGR, 2008]

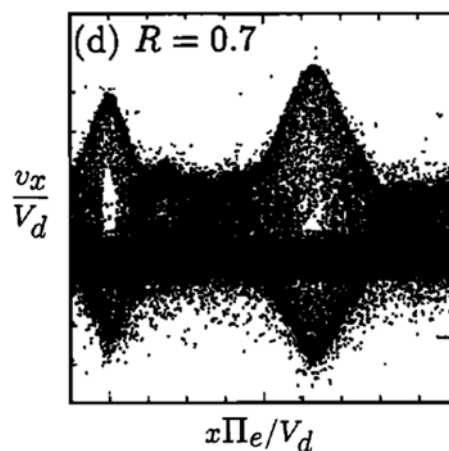


Figure 2: Electrostatic Solitary Waves
[Omura et al., GRL, 1994]