[EE] Eveningポスター発表 | セッション記号 P (宇宙惑星科学) | P-EM 太陽地球系科学・宇宙電磁気学・宇宙環境

[P-EM16]Dynamics of Earth's Inner Magnetosphere and Initial Results from Arase

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Earth's inner magnetosphere is a fascinating source of space research problems. There remain many fundamental questions concerning the physics of the radiation belts, the ring current, the plasmasphere and the ionosphere. The JAXA spacecraft Arase(ERG) was successfully launched in December 2016, and has since been providing excellent data on waves, particles and fields over a range of L-shells in the inner magnetosphere. This session particularly welcome submissions related to the Arase mission. As well, data from other recent missions to the magnetosphere are also welcome, including the Van Allen Probes, MMS, and THEMIS. Topics of interest include charged particle interactions with the predominant electromagnetic wave modes such as whistler-mode chorus and hiss, ion cyclotron waves, magnetosonic waves, and ULF waves. Projects involving the prevailing issues of particle acceleration and loss, and particle transport are also of interest. In addition, projects involving the coupling of plasma populations in the inner magnetosphere are also timely. Studies involving observations, simulations, theory and modeling are all invited.

[PEM16-P03]Simulation of oblique propagation for whistler mode triggered emissions in a parabolic magnetic field

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We perform two-dimensional electromagnetic particle simulation to study fundamental characteristics of whistler mode wave-particle interaction involved in chorus emissions propagating oblique to the background magnetic field. We assume simple periodic (x, y) system with the parabolic magnetic field taken in the x-direction. With the electrostatic components parallel to the magnetic field, which have been neglected in the previous simulation studies on chorus emissions, the distribution function in position can have a great influence on the simulation results. Assuming energetic electrons with anisotropic subtracted bi-Maxwellian velocity distribution function at the equator, we first put particles under harmonic bounce motion under a parabolic magnetic field. We next follow the motions of the particles adiabatically without any waves to obtain an equilibrium state as the initial distribution for the particle simulation. It is necessary to put many super-particles in a grid cell to suppress the thermal fluctuation. With 30,000 particles per cell, we have confirmed a good agreement of the wave growth in the parallel direction with the linear growth rate. We next put an array of antennas with obliquely aligned to background magnetic field, and oscillate the antenna current with a variable frequency below the electron cyclotron frequency to excite a large amplitude whistler-mode wave obliquely propagating to the static magnetic field. In addition to the nonlinear trapping of energetic electrons through the cyclotron resonance, another nonlinear trapping of electrons by the Landau resonance takes place. Structures of the nonlinear trapping potentials changes with a varying frequency, affecting the efficiency of energy transfer between the wave and energetic electrons. We study nonlinear evolution of the wave packet, and competing processes of both resonances in accelerating the energetic electrons to higher energies.