reconnection events between ground-based magnetometer data and upstream satellite data.

[VII-2-2] Harmonic plasma emission by electron beam - plasma interaction

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Electromagnetic radiation at the plasma frequency and its second harmonic, the so-called plasma emission, is fundamental process responsible for solar type II and III radio bursts. There have also been occasional observations of higher-harmonic plasma emissions in the solar-terrestrial environment. We will present that the simulation effort on characterizing the electron beam-generated plasma emission process at POSTECH. We have developed fully electromagnetic particle-in-cell (PIC) simulation code with three dimensions. We simulated harmonic plasma emission with various beam condition. Qualitative comparison with the traditional plasma frequency and second harmonic radiation theory is in good agreement. Higher harmonic emissions agree with the theory of coalescence of Langmuir and harmonic EM wave.

[VII-2-3] Electron Microburst Generation by Wave Particle Interaction

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Electron microbursts are the intense electron precipitation which durations are less than one second. We measured the energy spectra of the microbursts from 170 keV to 340 keV with solid state detectors aboard the low-altitude (680km), polar-orbiting Korean STSAT-1 (Science and Technology SATellite). The data showed that the loss cone at these energies is empty except when microbursts abruptly appear and fill the loss cone in less than 50 msec. This fast loss cone filling requires pitch angle diffusion coefficients larger than ~ 10-2rad2/sec, while ~10-5 rad2/sec was proposed by a wave particle interaction theory. We recalculated the diffusion coefficient, and reviewed of electron microburst generation mechanism with test particle simulations. This simulation successfully explained how chorus waves make pitch angle diffusion within such short period. From considering the resonance condition between wave and electrons, we also showed ~ 100 keV electrons could be easily aligned to the magnetic field, while ~ 1MeV electrons filled loss cone partially. This consideration explained why precipitating microbursts have lower e-folding energy than that of quasi-trapped electrons, and supports the theory that relativistic electron microbursts that have been observed by satellite in-situ measurement have same origin with ~ 100 keV electron microbursts that have been usually observed by balloon experiments.

[VII-2-4] Analysis of FUV auroras by high energy electron precipitation

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Our previous study showed the intensity of the long LBH (1600 - 1715 Å) was enhanced very much compared to that of the short LBH (1400 - 1500 Å) when the characteristic energy of the precipitating electrons increased from 1 keV to > 7 keV, in accordance with the theoretical models. In this presentation, we would like to present the results of our study for new modeling results about previous report and even higher energy electrons. We selected the events in which the fluxes both in the low energy (100 eV ~ 20 keV) and in the high energy (170 ~ 360 keV) were enhanced, and examined the auroral spectra for these events observed simultaneously by the imaging spectrograph on the same spacecraft. While the accurate characteristic energy could not be determined because of the gap in the energy range, our result showed the intensity ratio of the long LBH to the short LBH ranged from 1.2 to 2.0 in these events, in contrast to 1.0 or smaller for the events in which the highest enhancement was seen only in the low energy. Our study suggests that intense auroras might be accompanied by high energy electrons above 20 keV.

[VII-2-5] 무거운 이온을 포함하고 있는 플라스마에서 Pseudo-Potential Method와 1d PIC Simulation

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electron, ion, heavy ion으로 구성 된 plasma에서 hump type과 kink type(double layer)의 electrostatic solitary waves이 존재할 수 있다는 것을 pseudopotential method를 이용한 결과와 1d PIC(Particle-In-Cell) simulation method의 결과에서 각각 확인하였다. 1d PIC simulation에서 초기에 각각의 입자 종(species; electron, ion, heavy ion)의 밀도섭동(density