An analysis of energetic electron variation phenomena in the inner part of the Jovian magnetosphere with the Galileo data

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Jupiter has the largest and active magnetosphere with the particular characteristics of the rapid planetary rotation with the period of about 10 hours and volcanic satellite Io. It is expected that, therefore, internal sources of energy and mass are quit effective for the magnetospheric activities. Although it is known that the magnetosphere has high population of energetic particles, acceleration processes from cold Iogenic particles to keV - MeV particles and the location have been little known.

It is known that injection events occur in the inner part of the Jovian magnetosphere. Although it is expected that they are important for acceleration and transportation of energetic particles from outer to inner parts of the Jovian magnetosphere, their generation mechanisms have not been understood. Because the Jovian injection doesn't have local time dependence and has smaller flux enhancement than earth's injection, other physical processes are required Jupiter's injection event.

In order to clarify generation processes of Jupiter's injection events, we have precisely investigated variations of electron flux and magnetic field when injection events occurred. As a result of the analyses for a few electron flux various events, we found simultaneous occurrence of magnetic field fluctuations with injection events. These magnetic fluctuations included MHD waves of compressional mode and shear Alfven mode. The analysis of the Poynting vectors and wave number vectors of the MHD waves showed that the directions of the Poynting vectors of the compressional mode is approximately to Jupiter at about 12Rj, though it varies largely.

Origin and characteristics of injection events will be further discussed from statistical studies of the MHD wave. Furthermore, we will infer how the injection and MHD wave are generated by the interchange instability, which is expected to be one of the generation mechanisms of the Jovian injection.