Multisatellite observation of Pi2 pulsations in the inner magnetosphere

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The plasmaspheric cavity mode has been proposed as an excitation mechanism of Pi2 pulsations observed at low- and mid-latitude ground stations. Previous studies employing low-latitude ground stations and a satellite staying inside the plasmasphere revealed the radial structure of the plasmaspheric cavity mode on the nightside. A similar radial structure of the fundamental cavity mode was found even on the morningside (0600-1000 geomagnetic local time (MLT)) from observations of low-latitude ground stations and the ETS-VI satellite. The radial structure of the plasmaspheric cavity mode has been described by a number of studies, though its longitudinal structure is not well understood yet. The purpose of this study is to identify the longitudinal structure of the cavity mode by analyzing data from multiple satellites in the inner magnetosphere.

We used magnetic field measurements by the DE-1, AMPTE/CCE, and GOES satellites. The apogee of DE-1 and AMPTE/CCE is ˜4.6 Re and ˜8.8 Re geocentric distance, respectively. We also used geomagnetic field data from Kakioka (27.2 degrees geomagnetic latitude (GMLAT), 208.5 degrees geomagnetic longitude (GMLON)), Crozet (-51.5 degrees GMLAT, 111.5 degrees GMLON), and Hermanus (-33.9 degrees GMLAT, 82.2 degrees GMLON). It was found that when Pi2 pulsations were detected on the ground, similar magnetic field variations were observed by the DE-1 and AMPTE/CCE satellites located at radial distance of 4.5-6 Re. The magnetic field variations were dominant in the compressional component and had no clear phase delay between the satellites even if they are separated by more than several hours in longitude. The GOES satellite showed different signatures of the magnetic field variations from the DE-1 and AMPTE/CCE satellites. We will discuss the longitudinal structure of the cavity mode wave deduced from these observations.