

Longitudinal structure of plasmaspheric cavity mode deduced from low-latitude Pi2 pulsations

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The plasmaspheric cavity mode resonance has been proposed for an excitation mechanism of Pi2 pulsations observed at low- and mid-latitude ground stations. This mode is a wave mode in which fast mode waves emitted at a substorm onset bounce back and forth between two reflecting boundaries (the ionosphere and the plasmopause) and are radially trapped in the plasmasphere. Recent studies have shown that when the CRRES satellite and the Kakioka ground station were located in almost the same local time, the satellite observed oscillations in the compressional component that are almost identical to Pi2 pulsations in the ground H component. These studies revealed radial structure of the plasmaspheric cavity mode. However, its longitudinal structure is yet to be investigated.

In this study we investigated longitudinal dependence of characteristics of low-latitude Pi2 pulsations, using ground data and auroral images from the Polar ultraviolet imager (UVI). We used data for a period of December 1996 through March 1997. The onset time and location of substorms as well as auroral power enhancement were identified by the Polar/UVI images. More than 500 events of auroral breakups were found with auroral power enhancement of more than 2.0 gigawatts. We investigated variations of geomagnetic field in the Pi2 frequency band, using data from Kakioka ($L=1.27$, 208.5 degrees geomagnetic longitude) and Hermanus ($L=1.45$, 82.2 degrees geomagnetic longitude). The longitudinal structure of the cavity mode will be discussed on the basis of statistical results.