

Spatial distribution of the magnetic perturbation in the magnetosphere at the times of low-latitude round Pi 2's

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Pi 2 magnetic pulsations are damped magnetic oscillations having periods between 40 and 150 seconds; they are observed by ground-based magnetometers and satellites at the onset times of the expansion phase of substorms.

In this study, we use magnetometer data from the ETS-VIII geosynchronous satellite (M.Lat = -7.88deg, M.Lon = 218.56deg) [Koga and Obara, 2008], the THEMIS satellites [Angelopoulos, 2008], and a MAGDAS ground station YAP (M.Lat = 1.49, M.Lon = 209.09) [Yumoto et al., 2006]. We identified 100 isolated Pi 2 pulsations in the ground H (northward) component data from YAP in the period from 1 January 2009 to 31 May 2009; in this period, the apogees of the THEMIS satellites were located in the nighttime region at $5R_e < r < 30R_e$ (r : geocentric distance). We statistically investigated the maximum amplitude of the compressional magnetic field component observed by THEMIS in the interval of 5 min before and after the Pi 2 onset time observed at YAP. We found that large magnetic perturbations (>10 nT) were most frequently observed in the region of $r = 8-10R_e$ and $LT = 22-24$ hr. This location is the same as that of the Pi 2 source region deduced by Uozumi et al. [2007] from ground-based observations. Taking into account the decay of the fast-mode wave with distance from a source, the above result strongly suggests that the epicenter of the Pi 2-related compressional pulse is located in the region of $r = 8-10R_e$ and $LT = 22-24$ hr.

Keywords: Pi 2 magnetic pulsation, Pi 2 source, multi point observation, propagation