Latitude-Independent Pc5 Geomagnetic Pulsations Associated With Field Line Resonance

성숙경, 김관혁, 이동훈
경희대학교 우주과학과

The latitude-independent Pc5 pulsations with a spectral peak at ~3 mHz were observed with IMAGE and SAMNET magnetometer array, ranging from ~47° to ~77° geomagnetic latitudes, in the morning sector (0700-1000 local time) during an interval of 30 minutes on April 29, 2001. The spectral amplitude had a local peak at ~67°, where a sudden phase change of ~180° is found. A vortical equivalent ionospheric current structure centered at latitude between 67° and 71° was observed during the Pc5 pulsations and the rotational sense of the current vortex was reversed for one cycle of the pulsation. During the interval of the enhancement of the Pc5 pulsations, the Polar spacecraft crossed near the magnetic shell (L ~8) corresponding to the latitude where the spectral amplitude was maximum, and observed ~3 mHz pulsations in the radial electric field and compressional magnetic field components. Since the toroidal mode Alfven waves in the magnetosphere are characterized by an electric field perturbation in the radial direction, the simultaneous presence of the pulsations in both components indicates that a field line resonance (FLR) was driven by quasi-periodic compressional Pc5 pulsations. Using solar wind data, we confirmed that the compressional Pc5 pulsations at Polar occurred during an interval of enhanced solar wind dynamic pressure. From the analysis of the ground magnetometer data and Polar data, we suggest that the latitude-independent ground magnetic perturbations is caused by the vortical equivalent current (i.e., ionospheric Hall current) generated by FLR-associated field-aligned currents.