

A statistical study of Pi2 pulsations observed in the upper ionosphere using Swarm magnetic field data

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The properties of Pi2 pulsations observed in the upper ionosphere are studied using magnetic field data acquired by the Swarm-A spacecraft in low Earth orbit (LEO) and at the low-latitude Bohyun ground station (BOH, $L = 1,3$) for January 2014-Jun 2015. From time intervals when Swarm-A was on the nightside (magnetic local time (MLT) = 1800-0600 hrs) and the BOH station was near midnight (MLT = 2100-0300 hrs), we identified 623 Pi2 events in the horizontal H component of the BOH data. For each event we examine the coherence between the horizontal H component on the ground and the B_x (radial) azimuthal B_y (azimuthal), or B_z (compressional) components at Swarm-A. Out of 623 events, the B_x -H high coherence (> 0.7) events are $\sim 6\%$, the B_y -H high coherence events are $\sim 4\%$, and the B_z -H high coherence events are $\sim 25\%$. The ground-satellite high coherence events occurred when the spacecraft was located within a magnetic latitude range of $\pm 50^\circ$. Using the ground-satellite high coherence events, we examined the latitudinal structure of the relative amplitude and phase of the ionospheric Pi2 pulsations detected at Swarm-A. Confirming previous observations at LEO, we found that the ionospheric Pi2 pulsations are characterized by symmetric odd mode standing oscillations in the north-south direction, having a node for B_x oscillation and an antinode for B_z oscillation, respectively, at the equator. This indicates that the source of ionospheric Pi2 pulsations is the plasmaspheric resonance.

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