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Latitudinal distribution of quarter-wave length, standing Alfvén modes

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We have studied the latitudinal distribution of quarter-wave, standing Alfvén modes. The diurnal variation of the local field line eigenfrequency over the latitude range $L=1.7$ to $L=5.1$ was examined using cross-phase analysis of geomagnetic data from MEASURE, CANMOS, and CARISMA magnetometer arrays in North America. The detected eigenfrequencies for $L=2$ to $L=3.1$ were remarkably low near the dawn and dusk terminator. This occurred when one end of a field line was sunlit and the other end was in darkness. However, the eigenfrequencies for $L<2$ or $L>3.1$ were not extraordinarily low. These results suggest that resonant quarter-wave modes were localized in the middle latitude region. We will discuss why they quarter-wave modes were localized. In particular why they were not generated at high latitudes even though the ionospheric conditions were strongly asymmetric. We relate these findings to the latest results of studies of Magnetosphere-Ionosphere coupling.

Keywords: Magnetosphere-Ionosphere coupling, ULF, Field Line Resonance, MHD, Inner Magnetosphere, Plasmasphere