# Seasonal variation of Quarter-wave modes of standing Alfven waves

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We have studied quarter-wave modes of standing Alfven waves using geomagnetic field data.

The diurnal variation of the local field line eigenfrequency at latitude, L ˜2.6 was examined using cross-phase analysis of ground magnetometer array data. The detected eigenfrequencies were sometimes remarkably low near the dawn terminator, when one end of the field line was sunlit and the other end was in darkness. Later in the morning the eigenfrequency gradually increased to the normal daytime value.

By modeling this situation we show that the extraordinarily low eigenfrequency events appeared when the ionospheric Pedersen conductance was strongly asymmetric between both ends of the field line leading to the formation of quarter-wavelength-mode standing waves that revert to half-wavelength modes as the dawn terminator passes both conjugate points.

The results from our model show that the effects of the inductive Hall current and curvature of the field lines are required to understand the development of the quarter-wave mode. The conditions under which quarter-wave modes form provides an opportunity to understand Magnetosphere-Ionosphere coupling under realistic, asymmetric ionosphere conductance conditions. In this study, we will present the seasonal variation of some features of quarter-wave modes including the frequencies, occurrence, lifetime and conditions for quarter mode formation.