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Accelerated motion of a poleward-moving auroral form in the cusp

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Poleward-moving auroral forms (PMAF), the ionospheric signatures of flux transfer events (FTEs), are intermittent phenomena observed in the cusp during negative interplanetary magnetic field intervals. Previous observations from ground-based optics showed that PMAFs emerge from the poleward boundary of the stable cusp precipitation region, and move poleward, often having a strong azimuthal component. In this paper, taking the advantage of a high-sensitivity all-sky imager, which is situated at Longyearbyen, Svalbard, Norway, we present observations in which PMAFs can be distinguished inside the stable cusp precipitation region. The 630.0-nm all-sky images taken with a time resolution of 4 s reveal that one of the PMAFs that occurred at ~1100 MLT on 17 December 2012 moves poleward quasi-steadily inside the stable cusp region during approximately 3 min after its appearance near the equatorward edge, and then accelerates eastward immediately after it exits from its poleward boundary. Prominent acceleration is seen during approximately 2 min, suggesting that the duration in which the tension force works on the newly opened field lines is a few minutes.

Keywords: aurora, cusp, particle precipitation, magnetic reconnection, all-sky imager