Characteristics of Polarization of the Geomagnetic Negative Sudden Impulse

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Whether or not the polarization sense of the geomagnetic field at the time of SI- obeys the polarization rule of Wilson and Sugiura [1961] has not been demonstrated in the past. We have examined the polarization of the horizontal disturbance vector of SI- observed on May 13,1995. The polarization distribution of the SI- was consistent with that of SC. We consider that the contribution from the movement of twin vortex ionospheric current would be dominant to produce the polarization of the SI- and suggest that to examine a reversal of the polarization sense of SI would be one of effective means to know the inclination of interplanetary shocks or discontinuities.

Wilson and Sugiura [1961] reported that the horizontal vector of geomagnetic sudden commencement (SC) observed in high latitude was circularly polarized and concluded that it indicated hydromagnetic waves in the magnetosphere. They proposed a polarization rule that the sense of the polarization is counter-clockwise in the morning and clockwise in the afternoon. Araki and Allen [1982] demonstrated a latitudinal reversal of the sense of the polarization of SC around 64 - 72 latitude. As one of candidates for the cause of this latitudinal reversal, Nagano et al.[1985] suggested a model of horizontal movement of ionospheric current vortices. Although SCs have been analyzed by many investigators, detailed analysis on the geomagnetic negative sudden impulse (SI-) has not been made except for Araki and Nagano [1988]. Whether or not the polarization sense of the geomagnetic field at the time of SI- obeys the polarization rule of Wilson and Sugiura [1961] has not been demonstrated in the study by Araki and Nagano [1988]. We have examined the polarization of the horizontal disturbance vector of SI- observed on May 13,1995. The polarization distribution of the SI- was consistent with that of SC. We consider that the contribution from the movement of twin vortex ionospheric current would be dominant to produce the polarization of the SI- and suggest that to examine a reversal of the polarization sense of SI would be one of effective means to know the inclination of interplanetary shocks or discontinuities.