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Spatiotemporal characteristics of Toroidal Pc 5 ULF during high-speed solar wind intervals

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ULF waves in frequency band between 1.67 and 6.67 mHz, especially Pc 5 magnetic pulsations, are believed to contribute to Relativistic Electron Enhancement (REE) in the outer radiation belt during magnetic storms. Many researchers suggested that high solar wind velocity and high long-duration Pc 5 power observed on the ground in the storm recovery phase are closely associated with the production of relativistic electrons (Baker et al., 1998; Rostoker et al., 1998; Mathie and Mann, 2000; O'Brien et al., 2001, 2003). Theoretically, the polarization (toroidal, poloidal or compressional modes) of the Pc 5 pulsations is discussed for the effectiveness of transporting radially energetic particles in terms of radial diffsion. Most of ground-based works focused on the activities of Pc 5 pulsations (e.g., amplitude or power), and they have rarely considered the polarization of Pc 5 pulsations because of difficulty to identify it by using only ground-based observations.

The purpose of this paper is to directly demonstrate the polarization characteristics and its spatiotemporal distribution of Pc 5 waves in the inner magnetosphere by the in-situ observations. We analyzed the magnetic and electric field data obtained by Time History of Events and Macroscale Interactions During Substorms (THEMIS) for the REE (14) / Non-REE (10) events under the high-speed solar wind conditions during 2008, and identified the polarization of these Pc 5 waves. It is clear that the Pc 5 polarization characteristics are strongly local time dependent. We found that the dayside toroidal Pc 5 wave at the outer radiation belt (L $>$8) is the important role of the radial diffusion mechanism.