



Analyses of Helicity Sign in Magnetic Clouds Using Multi-point Observations

Pei Hsuan Lin (1) and Ya-Hui Yang (2)

(1) Institute of Space Science, National Central University, Jhongli, Taiwan (jnes40722@hotmail.com.tw), (2) Institute of Space Science, National Central University, Jhongli, Taiwan (yhyang@jupiter.ss.ncu.edu.tw)

Magnetic helicity can describe the twist of magnetic field lines. Theoretically, the sign of magnetic helicity is thought to be the same everywhere in the interior of magnetic cloud (MC). This study analyzes the helicity sign of MCs during 2007 to 2009 by using multi-point in-situ observations from the STEREO and Wind spacecrafts. In total, 14 MCs are identified to discuss the properties of flux rope parameters. According to the orientation of MC axis derived from a flux rope model and the time profiles of in-situ plasma and magnetic field measurements in multiple locations, all these 14 MCs are further classified into 6 events. Each event has complete data coverage by at least two spacecrafts. We found that 2 of 6 events show different magnetic helicity signs. By comparing with the solar source region from the SOHO/EIT and ground based $H\alpha$ images and the related coronal mass ejection (CME) from the SOHO/LASCO and STEREO/SECCHI observations, we suppose that such inconsistency of magnetic helicity sign could be due to the distorted magnetic structure of flux rope in MCs when propagating in the interplanetary space. We thus conclude that the studied MCs come from the same solar source region have the same sign of magnetic helicity.