[S08-4] Determination of Magnetic Helicity of Solar Active Regions using the Linear Force-free Field Model

임은경, 채종철
서울대학교 지구환경과학부

Magnetic helicity is a useful quantity in characterizing the magnetic system of solar active regions. We aim to measure the helicity of the coronal magnetic field of an active region based on the linear force-free field assumption. With a value of the force-free α, the coronal field is constructed from the extrapolation of SOHO/MDI magnetograms, and the constructed field lines are compared with the coronal loops in the EUV images taken by SOHO/EIT. The force-free α that best fits the loops is used to calculate the helicity of the active region. We have applied this method to AR 10696 during its first rotation so that obtained the range of value and the temporal variation of magnetic helicity. We have compared our results with the accumulated amount of the helicity transferred to the corona via the photosphere which is determined independently. We find that the two different methods yielded helicity values that are consistent within the difference of about 30~40%. The major difference is that the coronal helicity decreased one day while the injected helicity steadily increased all the time. The decrease was due to a couple of CMEs that occurred during the same day.

[S08-5] Determination of Coronal Magnetic Fields from Type II Band Splitting and Density Measurements

조경석, 문용재, 봉수찬, 김연한, 박영득
한국천문연구원

It was proposed that the band-splitting structure of a type II burst is attributed to the plasma emission from both upstream and downstream of shock regions. In this study, we present the Alfven speed and magnetic field strength in low corona (1.5 - 2.0 solar radii), which are deduced from the measurements of the band splitting and the coronal electron density. For this, we have examined a type II burst with the splitting structure that was observed by Green Bank Solar Radio Spectrometer (GBSRBS) on 2004 August 18, as well as its associated limb CME by MLSO/MK4 coronameter. From the splitting frequency ratio of the burst, we have estimated a density jump and the Alfven mach number under the assumption of a CME-driven perpendicular shock. For reliable determination of the shock speed and the Alfven speed, we have used the density distribution directly determined from MLSO/MK4 polarization brightness data instead of using a coronal density model conventionally adopted. The Alfven speed is then used to derive the magnetic field strength along the path of the shock. As a result, the magnetic field strength is estimated to be from 1.3 G (1.5 solar radii) to 0.6 G (2.0 solar radii), which are well consistent with the previous coronal magnetic field models. It is also found that the deduced Alfven speeds are comparable to those from the active coronal magnetic field model and the Newkirk coronal density model.