[구SS-03] Evolution of Single and Multiple Flux Rope Systems in the Solar Atmosphere under Twisting Motions

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Flux ropes are believed to be ubiquitously present in the solar atmosphere. The evolutions of an isolated single flux rope and multiple flux rope systems under twisting motions have been studied using three-dimensional resistive magnetohydrodynamic (MHD) simulations. All systems under investigation are found to show an eruptive behavior beyond a certain amount of twist. When the plasma beta is low in the overall atmosphere, the expansion of the flux ropes is rather free and a quasi-static evolutionary period lasts quite long before an eruption is initiated. When the plasma beta in the upper corona is rather high, the expansion of the system is more or less impeded and an eruptive behavior shows up very abruptly with a smaller twist than required by the eruption in the overall low beta plasma. This suggests that an initial confinement of a flux system either by a plasma or by an overlying field rather promotes a more catastrophic evolution eventually.

[구SS-04] The Formation of Magnetic Channel by Emergence of Current-carrying Magnetic Field

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We carried out a detailed analysis on the formation of the magnetic channel in AR 10930. The term magnetic channel indicates a series of polarity reversals separating elongated flux threads with opposite polarities. We have observed the emergence of the flux thread which comprises the magnetic channel as a function of time using data taken by Solar Optical Telescata (SOT)/Hinode, and found that: 1) the clear upflow (-0.5 to -1.0 km/s) and the downflow (+1.5 to +2.0 km/s) were found inside and at both tims of the thread ar pectively, 2) the inclination gradually changes from that of the horizontal field (~90°) to the slightly v2) ical field (~130°) as the channel evolre , 3) the transverse field was initially nearlse arallel to the neutral line, 4) a pair of strong v2) ical currents was detected with opposite direclescatay neathe channel. The n n-linea thorcathe chfield (NLFFF) model we ob thec ch moed that: 5) witlsesheared field lines continuouslse emergedtay neathe channelathen were piled below 2Mm, 6) the strong transverse ents wl current (~0.2 A/m2) wa chea ured ay neathe flux thread, 7) the current density gradually increased as the flux thread emerged. With those observational results, we suggest that the magnetic channel represents the emergence of the twisted flux tube that may have been formed below the surface in advance to the emergence.