[구SE-07] Ballooning Instability Induced by Coronal Flux Rope Merging

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A numerical simulation study of the solar coronal plasma reveals that a ballooning instability can develop in the course of flux rope merging. When magnetic field lines from different flux ropes reconnect, a new field line connecting farther footpoints is generated. Since the field line length abruptly increases, the field line expands outward. If the plasma beta is low, this expansion takes place more or less evenly over the whole field line. If, on the other hand, the plasma beta is high enough somewhere in this field line, the outward expansion is not even, but is localized as in a bulging balloon. This ballooning section of the magnetic field penetrates out of the overlying field, and eventually the originally underlying field and the overlying field come to interchange their apex positions. This process may explain how a field structure that has stably been confined by an overlying field can occasionally show a localized eruptive behavior.

[구SE-08] The Motion of Plasma in an Excited Quiescent Filament

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Quiescent filaments are bigger, more stable, and longer lived than active region filaments. So, the shape of a quiescent filament changes little during its lifetime and a fast motion of plasma rarely occurs. But when it is dynamically influenced by external phenomena, a rapid motion of plasma may temporarily occur. By analyzing the motion of plasma we can infer some of the magnetic structure permeating such an excited quiescent filament. We analyzed the Hα images of a quiescent filament in the northern hemisphere that was observed at Big Bear Solar Observatory on 2004 August 2, and found that: 1) the filament was excited by a flare that occurred in a remote active region located in the southern hemisphere, 2) By this excitation, a part of the filament moved vertically upward and horizontally out of main body, and then it stayed there without much motion. Then after it moved vertically downward and horizontally to the main body, 3) the final position of plasma, however, was not the same as the initial position, being about 14Mm above it. We suggest that the filament was initially in a more or less static equilibrium. The excitation of the filament broke the initial equilibrium, and then brought about a new one that is different from the original one. Since the filament should have magnetic field, it is likely that both the equilibria may have been maintained by diplike magnetic structures. Furthermore, the transition from one equilibrium to another as we inferred should have accompanied a permanent change of magnetic configuration as well.