M40b Analysis of Solar Flare Trigger Mechanism by Using MHD Simulation

Johan Muhamad, Kanya Kusano, Daikou Shiota, Yumi Bamba (Nagoya University)

As one of the largest sources of disturbance in the solar system, solar flare has been widely studied for many decades. It is strongly believed that the flare originates from the reconnection process of the highly sheared magnetic field in the solar corona. However, it is still unclear what kind of mechanism can trigger that process at the beginning of the flare event. Recently, Kusano et al (2012) proposed some trigger mechanisms which may initiate the solar eruption. They systematically studied the impact of emerging flux into several configurations of simple magnetic fields by numerical simulation. They found that there are two different types of small magnetic structures favor the onset of solar eruptions which may appear near the polarity inversion line (PIL)which are opposite polarity and reversed shear polarity that acted on highly sheared region of magnetic fields. We extend this work by using more realistic configuration of magnetic fields which mimic the solar coronal structure. In order to do this, we perform Nonlinear Force Free Field (NLFFF) extrapolation method on the vector magnetogram data from the Hinode satellite. This model of the magnetic field is then systematically injected by several emerging flux configurations in term of 3D magnetohydrodynamics simulation. We present first result of this numerical simulation to test the impact of the perturbation of small structure dynamics to the equilibrium state which obtained from NLFFF model. Our result suggests that the position and intensity of the emerging flux with respect to the initial NLFFF condition is very crucial for triggering the solar eruption. We will discuss some of the dynamics process which take place during the emergence of magnetic flux.