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フレアアーケード上空の高温高速流の観測・計算結果の比較研究
Comparative study of Observation and Calculation of Hot Fast Flow above a Solar Flare Arcade

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Solar flares are one of the main forces behind space weather events. However, the mechanism that drives such energetic phenomena is not fully understood. The standard eruptive flare model predicts that magnetic reconnection occurs high in the corona where hot fast flows are created. However, there is not enough observational knowledge of the physical parameters in the reconnection region. The inflow into the reconnection region, the temperature of the plasma in the reconnection region, and the temperatures and densities of the plasma jets predicted by reconnection, have not been quantitatively measured in sufficient. First, we will show a flare that occurred on the west solar limb on 2012 January 27 observed by the Hinode EUV Imaging Spectrometer (EIS) and found that the hot (?30MK) fast (>500 km s?1) component was located above the flare loop and discuss how extent we understand the key-region of solar flare. Second, it is important to answer why the most observation cannot detect the predicted flow or temperature in the reconnection region. One of the reasons why we cannot observe inside the magnetic reconnection region is due to its darkness. Generally we can see the bright cusp-like structure during solar flare, although the reconnection region is faint/blind. One may think that the temperature in the reconnection region is enough higher than that of cusp-like flare loops. Thus the wavelength of emission from reconnection region is different from flare loops. However, this is not entirely true. Magnetic reconnection causes rapid heating. Thus ionization cannot reach to the equilibrium stage. We have calculated the ionization process in the down stream of Petschek type magnetic reconnection. From our result, we can clearly see that plasma cannot reach the ionization equilibrium in the down stream of slow-mode shock. The typical emissions from magnetic reconnection region are FeIXX or FeXX, although the plasma temperature is equal to 40MK. The typical temperature and density of post flare loops are 10 MK and 10ˆ11 /cc, and the dominant emissions from post flare loops are from FeIXX to FeXXIII. Thus the wavelength of emission from reconnection region is not so much different from post flare loops. We will discuss how the emissions from reconnection region looks like by using several ionization calculations of magnetic reconnection.

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