Multiple Plasmoids in Solar Chromosphere Observed by Solar Optical Telescope (SOT)/Hinode: Evidence of Plasmoid-induced Reconnection in the Partially Ionized Plasma

K. ALKENDRA P. SINGH¹, HIROAKI ISOBE² and KAZUNARI SHIBATA^{1,2} ¹Kwasan and Hida Observatories, Graduate School of Sciences, Kyoto University, Yamashina 607-8471, Japan. ²Unit for Synergetic Studies for Space, Kyoto University, Yamashina 607-8471, Japan.

Magnetic reconnection is a fundamental process in which the magnetic energy is converted into the kinetic and thermal energy, and drives transient and energetic phenomenon on the Sun such as Jets, Solar Flares and Coronal Mass Ejections (CMEs). After the Yohkoh mission, there are many pieces of evidences of magnetic reconnection in the solar corona and the dynamics of magnetic reconnection has been widely studied through MHD simulations [1]. However, it is still unclear what determines the fast reconnection rate and bursty behavior of the magnetic reconnection. The solar chromosphere is partially-ionized and the collision between ions and neutrals arises, so in order to understand the coupling between the solar photosphere and corona, it is very important to understand the reconnection dynamics arising due to ion-neutral collisions in the solar chromosphere. Recent observations from Solar Optical Telescope (SOT) onboard Hinode has shown number of jet-like features (spicules, penumbral microjets, anemone jets) in the solar chromosphere. One of the key features in the observations is the presence of tiny, inverted Y-shaped structures called Chromospheric Anemone Jets [2]. The typical lifetime of these jets is 100 s - 300 s and apparent velocity of the jets is close to the local Alfvén speed, so fast reconnection indeed occurs in the solar chromosphere. How such fast magnetic reconnection could be realized in partially ionized, fully collisional plasma is poorly understood. In this meeting, I will present the recent observations of multiple-plasmoids in the solar chromosphere from the Solar Optical Telescope (SOT)/Hinode and discuss the scenario under which plasmoid-induced reconnection could take place in the solar chromosphere.

Keywords: Magnetohydrodynamics (MHD), Magnetic Reconnection, Solar Chromosphere.

References

[1] K. Shibata, *Physics of Magnetic Reconnection in High-Temperature Plasmas* (Ed. M. Ugai), Research Signpost, 193-237 (2004).

[2] K. Shibata et al., Science, 318, 1591 (2007).