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Small-scale magnetic reconnection in high resolution observations

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Using high temporal and spatial resolution observations of the New Vacuum Solar Telescope (NVST), combined with the data from SDO (Solar Dynamics Observatory), spectra from Hinode, as well as the X-ray data from RHESSI and GOES, we studied in detail the process of the magnetic reconnection during a confined solar flare in active region NOAA 11967 on 2014 February 02 (Figure 1). We found that the magnetic reconnection occurred between a twisted magnetic flux rope enveloping a filament and magnetic loops rooting in the near chromospheric fibrils. The most complete observational evidences of magnetic reconnection so far were observed in this event, including reconnection inflows and outflows, the newly formed magnetic loops, current sheet, hot cusp-shaped structures, downflows, and so on. The estimated reconnection rate ranges from 0.01 to 0.03, which belongs to fast magnetic reconnection. From EUV observations, we also found that the plasmoids formed in the current sheet and moved to the two ends of the current sheet. By using vector magnetic fields from SDO/HMI, we also carried out the data-driven simulation. The results showed that plasmoids formed in the current sheet and confirmed that the plasmoids are the mini twisted flux ropes.

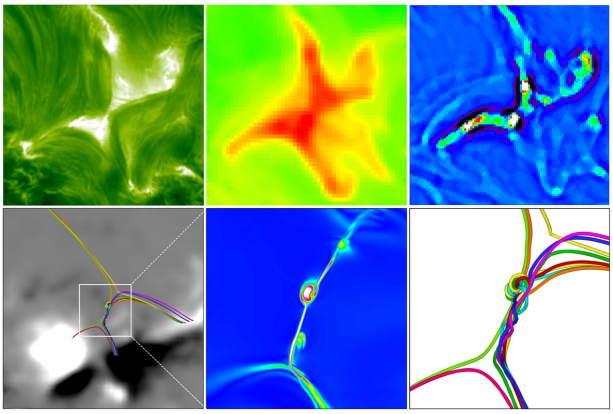

Figure 1. The fine process of the fast magnetic reconnect revealed by the observations of NVST and SDO and data-driven simulation.

References

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Note: Abstract should be in 1 page.