

Magnetic Reconnection and Current Sheets in Solar Eruptions

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Solar eruptions constitute the most violent energy release process in the solar system. They are created when magnetic energy is suddenly converted into heat and kinetic energy by magnetic reconnection in a field reversal region or current sheet. The effective electrical resistivity, η , of the sheet plasma plays a crucial role in energy conversion. Here we present the results for the current sheet thickness d and η determined by analyzing a set of unique data for three eruptions observed by the UVCS and the LASCO experiments on SOHO. Such a work was never conducted before since it is believed that the current sheet is too thin to be observable. The extremely large values of d and η obtained in this work suggest that the current sheet in solar eruptions is observable in some circumstances, and large-scale turbulence is operating within the current sheet. This constitutes a challenging goal for future research on the magnetic energy conversion occurring in both space and laboratory.