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# Hot Plasma Flows and Oscillations in the Flare Loop-top Region: Observations and Modeling

In this study, we investigate motions in the hot plasma in the above-the-loop-top (ALT) region during the 2017 September 10 X8.2 flare event. We examine the region to the south of the main flare arcade, where there is data from the Interface Region Imaging Spectrograph (IRIS) and the Extreme ultraviolet Imaging Spectrometer (EIS) on Hinode. We find that there are initial blueshifts of 20–60 km/s observed in this region in the Fe XXI line in IRIS and the Fe XXIV line in EIS, and that the locations of these blueshifts move southward along the arcade over the course of about 10 minutes. The cadence of IRIS allows us to follow the evolution of these flows, and we find that at each location where there is an initial blueshift in the Fe XXI line, there are damped oscillations in the Doppler velocity with periods of ~400 s. We use MHD simulations to investigate the possible sources of these oscillations. The reconnection outflows in the simulations impinge on the loops below, creating a "magnetic tuning fork", i.e. horn-shaped magnetic field lines that oscillate due to the rebounding reconnection outflow, creating magnetoacoustic waves. Simulations show a rapid growth of MHD instabilities around the upper parts of the ALT region (the arms of the magnetic tuning fork). Despite the presence of turbulent flows, the ALT region shows a coherent oscillation driven by the backflow of the reconnection jet, as in the observations.

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