INVESTIGATIONS OF SUPRA-ARCADE FAN AND TERMINATION SHOCK ABOVE THE TOP OF THE FLARE LOOP SYSTEM OF THE 2017 SEPTEMBER 10 EVENT

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On 2017 September 10, a major eruption on the west solar limb produced a class X-8.2 flare and a superfast coronal mass ejection (CME). During the eruptive process, the geometric topology of the disrupting magnetic configuration presented a clear flare-current sheet (CS)-CME structure. Analyzing the images and spectral data from the Solar Dynamics Observatory/Atmospheric Imaging Assembly (SDO/AIA) and the Interface Region Imaging Spectrograph (IRIS), we studied the supra-arcade fan (SAF) region between the bottom of CS and the top of flare loops in the south part of the disrupting configuration. Our results indicated that the SAF contained hot plasma of temperature up to $10^7$ K and electron density of $2.63 \cdot 10^9$ cm$^{-3}$, and the fast variation component (FVC) of the SAF light-curve shown by the IRIS slit-jaw images (SJI) displayed a quasi-periodic oscillating feature with the period of 1.28 min. We utilized the ATHENA code to simulate detailed evolutionary features of the magnetic structure of a typical two-ribbon flare. The numerical experiments duplicate observational features in many respects, including the spatial distribution and evolution in structures of the plasma and magnetic field, the turbulence and the termination shock (TS) in the SAF. Our results suggest that the SAF should be a high temperature structure that possibly contains the TS.