Space Science Seminar
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Turbulent Velocity Fields in the Plasma Sheets of Eruptive Solar Flares: Two-Dimensional Analysis

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In the space between coronal mass ejections (CMEs) and their associated post-eruption flare arcades, large sheet-like plasma structures are often observed in EUV and soft X-ray images. The fact that these hot (> 10 million K) and dense ($10^9/cm^3$) plasma sheets are visible for many hours -- sometimes more than 12 hours after the CME, despite conductive cooling times of less than a minute -- indicates that the energization mechanism persists throughout the duration of the solar flare. We presume the energization to be provided by magnetic reconnection at a current sheet, or many smaller current sheets, embedded in the plasma. Recent high-resolution image sequences reveal chaotic motions in the plasma, motions which necessarily contort the embedded magnetic field. Exploring the concept that these turbulent distortions to the magnetic field may accelerate and/or prolong reconnection in the post-CME current sheet, we have undertaken an investigation of the spatial and temporal variations in the velocity fields. Although the measurement of currents in the corona is beyond our grasp, by learning the characteristics of the velocity fields we gain information about the conditions which control the initiation, acceleration, and patchiness of the reconnection. I will present some initial findings from this investigation.

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