STUDY ON THE MULTIPEAK FLARE WITH HIGH TURNOVER-FREQUENCY MICROWAVE SPECTRA WITH SRH DATA

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The origin of multiple peaks in light curves of various wavelengths remains illusive during flares. Here we discuss the flare of SOL2023-05-09T03:54M6.5 with six flux peaks as recorded by a tandem of new microwave and hard X-ray (HXR) instruments. According to its microwave spectra, the flare represents a high-turnover-frequency (>15 GHz) event. The rather-complete microwave and HXR spectral coverage provides a rare opportunity to uncover the origin of such an event together with simultaneous EUV images. We concluded that (1) the microwave source originates around the top section of the flaring loops with a trend of source spatial dispersion with frequency; (2) the visible movement of the microwave source from peak to peak originates from the process of new flaring loops appearing sequentially along the magnetic neutral line; (3) the optically thin microwave spectra are hard with the indices (α_{tn}) varying from ~ -1.2 to -0.4, and the turnover frequency always exceeds 15 GHz; (4) higher turnover/peak frequency corresponds to stronger peak intensity and harder optically thin spectra. Using the Fokker–Planck and GX Simulator codes we obtained a good fit to the observed microwave spectra and spatial distribution of the sources at all peaks, if assuming the radiating energetic electrons have the same spatial distribution and single-power-law spectra but with the number density varying in a range of $\sim$30%. We conclude that the particle acceleration in this flare happens in a compact region nearing the loop-top. These results provide new constraints on the acceleration of energetic electrons and the underlying flare intermittent reconnection process.