SIMULATIONS OF EFFECTS OF ELECTRON ACCELERATION AND CORONAL PARAMETERS ON CORONAL TYPE III BURSTS

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A recently developed, plasma emission-based simulation model is used to investigate the effects of varying the electron acceleration and coronal conditions on the dynamic spectra of coronal type III bursts observed at Earth. The flux of $2f_p$ emission is significantly higher than that of f_p emission, which is unlikely to be observable except under very favourable propagation conditions. The flux and brightness temperature of $2f_p$ emission are affected significantly by variations in the parameters, while the frequency drift rate and half-power duration are affected only weakly. Furthermore, the simulations confirm the standard interpretation of the drift rate of $2f_p$ emission in terms of the plasma density profile and an average beam speed that agrees quantitatively with the simulated beam dynamics, for wide ranges of acceleration and coronal conditions. For weak acceleration events or events with high coronal electron temperature, the remote radiation shows characteristics that agree quantitatively with microbursts. When the acceleration is even weaker or the electron temperature is even higher, the acceleration events are radio-quiet, consistent qualitatively with hard X-ray observations. For similar acceleration originating in similar frequency ranges different density models yield quantitatively similar results except for the drift rate. Variations of the levels of a given density profile, corresponding to background corona or coronal streamers, can also cause significant changes in spectral characteristics.

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