HIGH FREQUENCY SOLAR RADIO EMISSIONS

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Radio bursts with fine structures in decimetric-centimetric wave range is generally believed to manifest the primary energy release process during flare/CME events. By spectropolarimeters in 1-2 GHz, 2.6-3.8 GHz and 5.2-7.6 GHz at NAOC/Huairou with very high temporal (1.25-8ms) and spectral (4-20 MHz) resolutions, the zebra patterns, spikes, and new types of radio fine structures with mixed frequency drift features are observed during several significant flare/CME events. As an example, a burst event on Dec. 1, 2004 observed by NAOC/Huairou radio spectropolarimeters and hard X-ray observations from RHESSI satellite, is investigated in a self-consistent way on the kinetic process of energetic electrons. With the trap-plus-precipitation model for the transport of energetic particles in the solar flare, the non-thermal emissions of radio fluxes are fitted with gyrosynchrotron radiation mechanism, with the elimination of the thermal component from the observed total radio emission flux. It is found that the linear increased electron escape rate can best fit to the observed radio fluxes. The slopes of electron escape rate are decreased as the frequency increases. Finally, the need for imaging spectroscopy over decimetric- centimetric wavelength range is addressed and the current status of the Chinese Spectral Radioheliograph (CSRH), one of such facilities, is introduced.

Solar Radio Emission, Solar Hard X-ray Burst, Radioheliograph