SHOCK DRIFT ELECTRON ACCELERATION AND SOLAR TYPE II BURSTS

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It is supposed that type II bursts are generated by beams of accelerated electrons at a shock front. Zlobec et al. (1993) suggested that a nearly perpendicular wavy shock front may enhance shock drift electron acceleration and be responsible for a fine structure (herringbones) of solar type II bursts. Here we examine this possibility quantitatively. An analytical model of a wavy shock is created and electron trajectories are calculated using a guiding centre approximation. It is studied how electron acceleration efficiency depends on geometric parameters of the shock and on a global angle between the shock front and ambient magnetic field. The results are compared with a simple plane shock.

A resulting distribution of reflected and accelerated electrons is simplified and introduced into a 2-D relativistic electromagnetic particle-in-cell model and a wave generation is studied. Numerical modelling shows not only a generation of Langmuir and high-frequency electromagnetic waves as expected, but also an efficient generation of whistler waves by the normal Doppler resonance process. There are indications that the whistlers participate in conversion processes generating the high-frequency electromagnetic waves (type II radio bursts).