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0.1 Microwave diagnostics of the solar coronal magnetic loop parameters and dynamics

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The spectral and temporal evolutions of the low-frequency (LF) pulsations modulating the microwave radiation (37 GHz) of solar flares recorded at the Metsaähovi Radio Observatory were studied by means of a "sliding window" Fourier analysis.

Microwave radiation of solar flares is interpreted as an electron gyrosynchrotron radiation produced on harmonics of the gyrofrequency. In the case of a power-low distribution of electrons in energy the intensity of gyrosynchrotron radiation from the loop is proportional to a moderately high ($\sim$1,5...6) power of the background magnetic field. Therefore, any slow variations of the magnetic field associated with disturbances of the electric current in a radiating source, will modulate the intensity of the microwave radiation.

Quite often the dynamic spectra of the LF pulsations contain several spectral tracks demonstrating a similar or slightly different temporal behaviour. We consider the multi-track features of the LF spectra as an indication that the microwave radiation is produced within a system consisting of several closely located magnetic loops having slightly different parameters, and involved in a common global dynamical process. Application of the equivalent electric circuit models of the loops with inclusion of the effects of electromagnetic inductive interaction in groups of slowly growing current-carrying magnetic loops allows to explain and reproduce the main dynamical features of the observed LF modulation dynamic spectra. Each loop is considered as an equiv-

alent electric circuit with variable parameters (resistance, capacitance, and inductive coefficients) which depend on shape, scale, position of the loop with respect to other loops, as well as on the plasma parameters and value of the total longitudinal current in the magnetic tube.

Sun:corona – Sun:flares – Sun:magnetic fields – Sun:oscillations – Sun:radio radiation