



On the three harmonics of solar type III bursts at the decameter wavelengths

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Harmonic structure of type III bursts are explained in terms of plasma emission mechanism. The second harmonic emission is well known. But there are theoretical papers about the third harmonic of type III bursts. And there were observations of the third harmonic of such types of bursts as U, J, V, II.

We observed triple type III bursts where frequency ratio is close to 1:2:3. They are structures where type III emission is repeated at the double and triple frequencies. Incidentally, components of triple type III bursts are not only standard type III but also type IIIb bursts. We registered 30 triple bursts during 2011 and 2012 years.

Observations were made by radio telescope URAN-2, Poltava, Ukraine. It enables polarization measurements at the frequencies 8 – 32 MHz. URAN-2 allows registration of radio emission with time and frequency resolution 10 ms and 4 kHz correspondingly.

We analyze properties of the components of triple bursts and their dependencies on frequency, type of burst and on the position of the component within the triplet. The main properties of the components of triple bursts such as duration and drift rate are similar to those of standard type III and IIIb bursts.

We find usual for type III bursts dependencies such as follow: duration decreases with frequency, the type IIIb bursts have always smaller duration at the same frequencies, all bursts drift from high to low frequencies. But we also find the linear dependence of drift rate on frequency.

All components of a trio have the same sign of polarization. Polarization of the first component is always the highest in triple bursts. It corresponds to the generally accepted viewpoint about the first harmonic emission. The second and the third components of trio have low polarization. It is typical for the second and the third harmonics according to the plasma radiation mechanism.

We discuss possible emission mechanisms and theoretical aspects of observed dependencies.

The most of detected regularities are explained on the assumption of harmonic relation in triplet.