Multi-Wavelength Investigations of Solar Activity
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On the nature of the solar microbursts emission in decimeter range of wavelengths

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Results of the new observations of long existing microbursts (MB) are presented. It is revealed that the MB spectrum can have the details with the narrow frequency band ($\Delta f/f < 0.03$). It was earlier marked [Bogod, Mercier & Yasnov (2001)] that the MB arise together with noise storms. In the given observations is detected that MB may be connected with a flare and have arisen about 1.5 hours prior to a flare. For the first time it was possible to register MB, which degree of polarization is less 1 (from 0 till 0.16).

Possible mechanisms of radiowave generation in MB are analyzed. The special attention is given to the mechanisms giving primary generation of ordinary waves. Together with widely known mechanism of radiowave generation at fundamental plasma frequency, the mechanisms connected with generation of upper hybrid waves and with resonant transitive radiation are considered. It was shown that the radiation at the frequency of the upper hybrid waves is always corresponds to o-mode type emission. The radio emission at the second harmonic of the upper hybrid frequency may be also polarized in the o-mode type, but this case is less probable than the previous one.

In the case of plasma mechanisms the corresponding radio emission in the active region may be generated by the high-frequency plasma turbulence of a necessary intensity. Otherwise the greatest contribution to the radio emission can give the resonant transitive radiation (RTR). Here the presence of small-scale turbulence with smaller intensity in the generation region is needed. The most probable mechanisms of generation of such turbulence are considered: the thermal fluctuations, the Langmuir and ion-sound waves, the quasi-stationary structures created by plasma waves. The fluctuations of electronic density caused by plasma waves result into the less intensive resonant transitive radiation, than direct conversion of plasma waves in electromagnetic one. The generation of RTR on the density fluctuations connected with ion - sound waves is most probable. The taking into account the conditions at which RTR intensity becomes higher, than intensity of gyrosynchrotron radiation at higher frequencies, one can determine an estimation of the maximal intensity of a magnetic field in the generation region of a radio emission. The RTR from the active region with usual coronal parameters may be more intensive, than in the case of gyrosynchrotron radiation, if B <3.5G for thermal fluctuations, B <15G for Langmuir waves and B <25 G for ion – sound waves.

The analysis of possible mechanisms of modulation of radiation MB is carried out: a) the modulation of background plasma and/or fast electrons low-frequency MHD - waves; b) periodic injection of fast electrons due to dynamic reconnection of a magnetic field in the current sheet; c) nonlinear interaction of plasma waves among themselves and waves with particles of plasma; d) fluctuations of a magnetic loop as equivalent electric contour. As a result of the analysis may be concluded that dynamic reconnection of a current sheet gives may be have more stable period and its value is close to observable.

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References

Bogod, V.M., Mercier, C. & Yasnov, L.V. 2001 *Journal Geoph. Res.* **106**, 25.353.

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