Solar Radio Spectrometer at Waveband of 4.5 GHz – 7.5 GHz and Some New Results of Observations

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Abstract

A new broadband solar radio spectrometer at waveband of 4.5 – 7.5 GHz has been developed in Purple Mountain Observatory for Solar Maximum 23. It is a multi-channel and frequency agile one. Its instantaneous bandwidth is 600 MHz and its frequency coverage is 3 GHz, therefore, it is divided into 5 bands. Its frequency resolution is 10 MHz, its time resolution varying freely from $1ms$ to $5ms$ and it has a sensitivity of $\triangle I/I \leq 2\%$. The observing bandwidth varies from 600 MHz to 3 GHz.

Since Aug., 1999, more than 100 solar microwave spectral events have been observed and some new results of observations are obtained. The event of Aug. 25, 1999 began at 01:33:06 UT is a typical microwave type III burst with rich fine structures. Such as fiber-like, V-shaped and necklace-like structures etc. Especially, the reverse drifting rate of V-shape structure is faster than normal one in the initial part of reverse drifting component, then it is slower than the normal one from some frequency to the turn-over frequency. This probably means that the mirror point moving upward against the electron streaming, then the downward electron beam will be damped and change the drifting rate from faster to slower. In the interval of 01:34:36.347 — 01:34:36.641 UT, a cluster of type U and reverse type U structures extended from about 4.9 GHz down to 7.3 GHz and formed necklace-like structure, this may be the evidence of twisted magnetic rope. Another interesting event on Oct. 27, 1999 is also a group of type III burst which consists of some time modulated drifting belts in opposite directions, and each drifting belt contain many fast drifting type III bursts with almost the same drifting rate. For the drifting belt at same drift direction, there is a tendency that the drifting rate is almost the same, too. But the drifting rate is much slower for reverse drifting belt than for normal one. Such a character may reflect the periodic reconnection process of complex system of the magnetic loop.