PULSATING TYPE IV BURSTS AT METRIC WAVELENGTHS AND CORRESPONDING OPTICAL AND MICROWAVE FEATURES

Takeo Kosugi
Tokyo Astronomical Observatory, Mitaka, Tokyo 181, Japan

EXTENDED ABSTRACT

Pulsating type IV solar radio bursts or radio pulsations are characterized by quasi-periodic modulation of meter-wave continuum emission. The main properties of them are summarized by Wild (1973). The aims of this paper are (i) to re-examine the spectral characteristics of the radio pulsations in some more detail using the unified data set of 21 events obtained with the Nobeyama 70 - 600 MHz radiospectrograph (Kai et al., 1980) since September 1977, and (ii) to discuss their association with other flare phenomena such as Hα flares, microwave bursts and so on.

From the spectral study I have found out that, in the cases of about two thirds of the 21 events, the pulsation is confined in a clear frequency band and separated from other type IV or continuum emissions, if any, on the dynamic spectrum. Almost all such events show a type II-like frequency-drift, the drift rate of which is typically - 0.2 MHz/sec at a frequency of about 200 MHz, a little bit smaller than that of the type II burst. I suggest, from the morphological study of the dynamic spectra such as mentioned above, that the radio pulsations can be divided into three subclasses : (i) subclass (A) — Frequency-drift Type, (ii) subclass (B) — Complex or Well-developed Type, and (iii) subclass (C) — Amorphous or Decimetric Type.

The optical associates of the radio pulsations are relatively brilliant flares : among the 21 events, 8 are associated with B-flares, 9 with N-flares, and none with F-flares (2 — no flares reported, 2 — flare patrol report not so far available, in the Solar-Geophysical Data). On the other hand, though 20 out of the 21 radio pulsations are associated with microwave bursts, the intensity of associated microwave bursts are generally very weak : less than 50 s.f.u. at 17 GHz in 16 cases out of the 20.

I have investigated several individual pulsation-associated microwave bursts in detail using the interferometric observations made at 17 GHz at Nobeyama (Nakajima et al., 1980). I suggest that the pulsation at metric wavelengths always has a corresponding component in the associated microwave burst, and also

that the component shows a nature of weak, nonthermal source. One of typical events has been discussed in a separate paper (Kosugi, 1980). I lay stress upon the fact that the interconnection exists between nonthermal microwave source and the pulsation. This observational fact may afford a clue to explain the physical processes involved in the radio pulsation.

References

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