SOLAR RADIO PULSATIONS

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Abstract (*Solar Phys.*). Several models for pulsating type IV radio bursts are presented based on the assumption that the pulsations are the result of fluctuations in the synchrotron emission due to small variations in the magnetic field of the source. It is shown that a source that is optically thick at low frequencies due to synchrotron self absorption exhibits pulsations that occur in two bands situated on either side of the spectral peak. The pulsations in the two bands are 180° out of phase and the band of pulsations at the higher frequencies is the more intense. In contrast, a synchrotron source that is optically thin at all frequencies and whose low frequency emission is suppressed due to the Razin effect develops only a single band of pulsations around the frequency of maximum emission. However, the flux density associated with the later model would be too small to explain the more intense pulsations that have been observed unless the source area is considerably larger than presently seems reasonable.

DISCUSSION

Dulk: I believe that you did not include the effects of betatron acceleration and deceleration on the electrons as the tube contracts and expands. Inclusion of this would greatly increase the depth of the modulations of the radiation that you calculate.

Gotwols: I agree. I considered a highly idealized homogeneous flux tube 10000 km in diameter by 100000 km in length.

Rosenberg: You used quite large gyro frequencies; would your result be much effected if you use smaller values for the magnetic field strength.

Gotwols: The calculated flux is quite sensitive to the assumed nonrelativistic gyro frequency. To some extent it is possible to compensate for a decrease in the gyro frequency by assuming a larger number of energetic electrons. I don't think the gyro frequencies I have assumed are particularly large for a spectrum with a peak in the decimetric wavelength range.

McLean: We (Sheridan and I) have recently observed a spectrum showing a very fine series of regular pulses. These show a clear sawtooth wave form with a rise time about twice the decay time for each pulse which I find difficult to provide with a standing wave oscillation as the cause of the modulation.

Gotwols: If the standing wave in the magnetic flux tube is strictly sinusoidal, then it is true that the theory presented here can not yield an asymmetrical temporal profile at a single frequency.

Gordon Newkirk, Jr. (ed.), Coronal Disturbances, 471.