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Section 6. Solar Emissions and Related Terrestrial Phenomena

The observations of interplanetary scintillations of radio sources have been continued at Toyokawa, Fujigane and Sugadaira. These observations are now being carried out automatically.

The relations between the solar activity and the enhancement of solar wind velocity has been studied. Most of the enhancements of solar wind velocity and scintillation-index are caused by corotating high velocity streams about the sun and the peaks of these velocity enhancements are usually about 2 days behind those of the scintillation-index enhancements. Our preliminary analyses show that these high velocity streams are usually associated with the old calcium plage regions, but some streams are not correlated with the photospheric activities. Several intense flares were observed in May and August, 1972. We are also analyzing our data in these periods to find the relation between the flare disturbance and the interplanetary scintillation.

Recently, many authors have suggested that the power law spectrum may be more realistic than Gaussian spectrum for the density irregularities in the interplanetary medium. Our observations show that the spectrum of 3C48 scintillation is approximated by $(\text{frequency})^{-2.3}$, excepting the low frequency part where the Fresnel filtering effect is considered to be dominant.

In the analysis of the observations of interplanetary scintillation, we have to eliminate the low frequency components of the observed intensity fluctuation, which are partly due to the ionospheric scintillation, and also the high frequency components, which have low signal to noise ratio. Furthemore, when we derive the wind velocity with the assumption of the elliptical spectrum of the diffraction pattern or the ellipsoidal spectrum of the electron density fluctuations in the solar wind, we have to cut off the low frequency part of spectrum of the intensity fluctuations which corresponds to the low wavenumber range of spectrum of the pattern where the Fresnel filtering effect is dominant. These filtering will change the form of the cross-correlation function and therefore we cannot use the correlation analysis developed by Briggs, Phillips and Shinn and by Phillips and Spencer. We have proposed a method of analysis for deriving the solar wind velocity, considering that the spectrum of the diffraction pattern can be approximated by a power law and that the maximum value of the normalized cross-correlation function between two records increases with increasing source size.

Washimi has discussed the self-focusing of the transverse waves (comprising the

whistler, Alfvénic and electromagnetic modes) propagating along an applied magnetic field in a plasma of finite temperature. The method of stretching which has been used by Taniuti and Washimi is applied. It is shown that behaviours of the wave amplitude are described by the nonlinear Schrödinger equation and that the threshold power for the self-focusing becomes very small not only at the special frequency for the whistler wave, which was already obtained in the previous paper, but also at a frequency for the Alfvén wave. The expression of the coefficient of the nonlinear Schrödinger equation is revised.

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