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Section 6. Solar Emission and Related Terrestrial Phenomena

A new three-station (Toyokawa, Fuji and Sugadaira) system for the observation of interplanetary scintillation (IPS) at a frequency of 327 MHz (UHF) has been almost completed. Each station has a parabolic cylindrical antenna. The tracking of a radio source is carried out by mechanical rotation of the antenna in the N-S direction and by beam scanning with a phased array in the E-W direction. The dipole array along the focal line consists of 192 elements of the half-wave dipole which are spaced 0.56 wave-length apart. Outputs of two adjacent dipoles are combined and amplified with a low-noise preamplifier followed by a phase shifter; the total number of preamplifiers and phase shifters is 96. We can tilt the antenna beam in the E-W direction by 15 degrees from the meridian plane. Details of the system are given in this proceedings.

Preliminary IPS three-station observations at 327 MHz have started. IPS observations at 69 MHz (VHF) have been continued.

The data-book of the solar wind speed from IPS measurements for January-December, 1980 has been published.

Observations of 3C48 at 327 MHz show that the electron density spectrum at $0.4 \sim 0.5$ AU from the sun is described by a power law with average slope $\simeq 3$. We have observed an interplanetary shock disturbance generated by a solar flare at a high latitude of 63° and a radial distance of 0.37 AU. The electron density spectrum is also represented by the same power law. The detailed spectral and cross-correlation analyses will be given elsewhere.

For both theoretical and experimental studies of the solar wind, the computer-simulation is expected to be a powerful method. Washimi and Ogino (in 1st section) have started it for the studies on 2- and 3-dimensional structure and dynamics of the solar wind near the sun. Using a MHD 2-step Lax-Wendroff code and assuming appropriate values for macroscopic coefficients such as adiabatic constant and electrical conductivity, a 2-dimensional axis-symmetric stationary solution has been found. For the next step we are going to study detailed structure and dynamical properpties of the solar wind.

A theoretical model of the triggering of a solar flare by magnetosonic waves in a neutral sheet plasma is discussed. It is shown that the ponderomotive force due to the magnetosonic waves strongly excites the plasma convection flow in the magnetic neutral sheet which in turn enhances the tearing instability. The system of basic equations for the tearing mode including the time-averaged nonlinear effects due to the magnetosonic waves is derived and the boundary value problem is solved. The results show that the growth time of the instability is shortened to about 100 sec for reasonable magnetosonic wave intensity.

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