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ACTIVITY REPORT

Section 1. Propagation of Atmospherics and VLF, ELF Radio Noise

Solar and interplanetary dynamical processes have been studied by means of an MHD computer simulation. The properties of the transonic solution of the solar wind and the related interplanetary shock wave have been investigated in a cylindrically symmetric two-dimensional system. It is found that the interplanetary shock waves can be driven by a sudden increase of the temperature at the base of the solar wind even if the temperature change is not as strong as in the case of solar flares, and is located in a limited latitudinal region. This result will explain the observation of interplanetary shock waves associated with no prominent phenomena on the solar surface.

A global MHD simulation of the interaction of the solar wind with the earth's magnetosphere was executed by using two- and three-dimensional models in order to study the magnetotail dynamics. In the two dimensional simulation a series of hot plasma bubbles (plasmoids) were generated by reconnection within the near-earth plasma sheet and propagated down the tail with a local Alfven speed for southward IMF. In the three dimensional case, a similar hot plasma bubble was created and propagated down the tail by the near-earth magnetic reconnection. However, its magnetic configuration was different from the two dimensional one because the east-west component of magnetic field was greater than the north-south component in the regions apart from the noon-midnight meridional plane. Moreover, a global two-dimensional MHD simulation of the interaction of the solar wind with outflowing plasmas from a comet was carried out to study the structure in the interaction region and the cometary tail dynamics.

Formation of large scale and large amplitude electrostatic potential along magnetic field lines due to the high-speed plasma flow in auroral plasma has been also studied numerically. The potential profile is found to be controlled by the particles which are trapped between the electrostatic and magnetic mirror potentials. Under the currentless and quasi-neutral conditions, a potential profile

consistent with observations has been found by introducing trapped electrons.

Washimi presented an invited lectures on the topics of space plasma physics at the XVII International Conference on Phenomena in Ionozed Gases in Budapest, July 8-12 . Ogino attended the Chapman Conference on Magnetotail Physics at the Applied Physics Laboratory, Johns Hopkins University, October 28-31, the APS Meeting of the Division of Plasma Physics in San Diego, November 4-8, and the Fall AGU Meeting in San Fransisco, December 8-13 in order to present contributed papers of the MHD simulation study.

February 28, 1986

- Tetsuya Sato -

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