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ACTIVITY REPORT

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

A global computer simulation of the interaction of the solar wind with the planetary and cometary magnetospheres has been executed by using two and three dimensional time-dependent magnetohydrodynamic (MHD) models. In particular, simulation studies for the interactions of the solar wind with the comet Halley and Venus ionospheres as well as the earth's magnetosphere have been energetically carried out. The model reproduced several features of the comet and solar wind interaction predicted by earlier theories and observed by the Suisei probe sent to study comet Halley. The weak bow shock is located a distance 3.2×10^5 km in front of the comet, and the Mach number is reduced to $M=2.48$, from the upstream solar wind value $M=7.25$, due to the plasma production and heating processes. The magnetic field is enhanced to about 3.7 times the interplanetary magnetic field (IMF) value (5nT) through the weak bow shock, and successively increases toward the front of the comet to reach a maximum of 34nT. The IMF lines hang on the cometary plasma to form lobes and a thin cometary cold plasma sheet. In the interaction of the solar wind with the Venus ionosphere, a quasi-steady-state configuration of the Venus ionosphere, including the bow shock, piled up magnetic field and ionopause, was well reproduced by using a three dimensional MHD model with mass loading effects. The Venus magnetotail is elongated in the IMF direction and a wavy structure appears at the ionopause. The interaction of the solar wind with the earth's magnetosphere was again simulated by using a three dimensional MHD model with twice the spatial resolution as the previous model. The main results have not changed from those obtained previously but several interesting phenomena have become clear and in more detail. Ogino will present the simulation results of the earth's magnetosphere as an invited paper at the Symposium on Quantitative Modeling of Magnetosphere-Ionosphere Coupling Processes in Kyoto, March, 1987.

In March, 1986 Prof. T. Sato , who belongs to the Institute for Fusion Theory of Hiroshima University, left our section and Prof. A. Iwai has temporarily taken over the responsibility.

February 28, 1987

-Akira Iwai-

-Tatsuki Ogino-

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