Paper ID: 38107
interactive

20th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Interactive Presentations (IP)

Author: Dr. Jinpeng Han
China Academy of Launch Vehicle Technology (CALT), China, Hanjinpeng520@126.com

INVARIANT MODULATION OF IMF CLOCK ANGLE ON THE SOLAR WIND ENERGY INPUT INTO THE MAGNETOSPHERE

Abstract

By use of the global PPMLR Magnetohydrodynamics (MHD) model, a serial of quasisteady-state numerical simulations were conducted to examine the modulation property of the interplanetary magnetic field clock angle θ on the solar wind energy input into the magnetosphere. All the simulations can be divided into seven groups according to different criteria of solar wind conditions. For each group, 37 numerical examples are analyzed, with the clock angle varying from 0 to 360 degrees with an interval of 10 degrees, keeping the other solar wind parameters (such as the solar wind number density, velocity, and the magnetic field magnitude) unchanged. As expected, the solar wind energy input into the magnetosphere is modulated by the IMF clock angle. The axisymmetrical bell-shaped curve peaks at the clock angle of 180 degrees. However, the modulation effect remains invariant with varying other solar wind conditions. The function form of such an invariant modulation is found to be $\sin^{2.70}(\theta/2)+0.25$.