CONCERNING THE INTERACTION OF INTERPLANETARY SHOCKS WITH THE EARTH'S MAGNETOSPHERE

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The talk will consist of two parts. In the first part, we discuss results from global MHD models (runs of BATS-R-US model provided by CCMC.GSFC.NASA.GOV) for two artificial events in which fast forward shocks interact with the magnetosphere for northward and southward IMF orientations with a small Bx component. Our results show the propagation of the shock (or fast wave) from the dayside magnetosphere toward the magnetotail and the formation of a reflected fast shock (wave) moving sunward. This reflected shock was predicted previously by Samsonov et al. (2007). We pay particular attention to the evolution of ionospheric currents in the model. In the case of northward IMF, the model predicts two current systems which correspond to the NBZ and Region 1 currents. In the course of the shock's propagation, these currents intensify successively. The NBZ current peaks as the shock front reaches the terminator plane, while the Region 1 current peaks about 2-3 minutes later. These currents are generated by dynamo regions in the magnetosphere. Using (E·J) contours, we observe intensifications of the magnetospheric dynamo which we relate to intensifications of ionospheric currents. The purpose of our work is to describe the geometry of the magnetospheric-ionospheric currents which can be applied to stationary magnetospheric conditions.

In second part of the presentation, we discuss results for the interaction of oblique interplanetary shocks with the bow shock as obtained from a local 3-D MHD model. New discontinuities appear in the magnetosheath downstream from the fast forward shock, but the variations of MHD parameters there are similar to those in the previously studied case of direct interaction. When normal to the oblique shock lies in the GSM XY plane, magnetosheath conditions at the dawn and dusk flanks are different. Consequently the two magnetopause flanks are affected by different solar wind pressures.