GLOBAL HYBRID SIMULATIONS OF THE MOON'S WAKE-TAIL

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We have studied the structure and properties of the Moon's plasma wake-tail by means of a two dimensional global hybrid simulation (particle ions, fluid electrons). Different interplanetary magnetic field (IMF) configurations have been examined for the angle between the direction of the solar wind flow and the IMF between 0 and 45 degrees. The Moon acts as a diamagnetic obstacle removing plasma from the solar wind flow and the tail refilling process on the moon's nightside occurs due to plasma expansion into a vacuum driven by the thermal motion of particles along the IMF magnetic field lines. We have examined the properties of the wake-tail formed behind a Moon-sized obstacle embedded in the solar wind flow for spatial scales up to 50 Moon radii using up to 200 million particles in each simulation run. Results of our study suggest that kinetic processes occur in the Moon's wake-tail that are beyond the ideal MHD description. For example, counterstreaming and anisotropic plasma distributions in the Moon's downstream tail refilling region represent unstable plasma configurations which excites different types of wave modes whose nature depends on the structure of the tail (i.e., on the orientation of the IMF). An initial analysis of these waves for the different cases studied thus far indicate the presence of both electrostatic and electromagnetic emissions. The electrostatic emissions are likely to be ion-acoustic type waves and the electromagnetic emissions are probably whistler waves. The simulation results will be compared with Wind satellite Moon flyby data and Lunar Prospector orbiter data where possible.

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2. H - Waves in Plasma

3. (a)

4. I - Invited Paper

5. No special instructions