

Particle simulation for the generation of potential drop in the lunar wake

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A field-aligned potential drop can be created in the lunar wake as a result of the solar wind diffusion into the void region behind the Moon. Ogilvie et al.[1994] estimated the potential drop to be 400V from the observation of the solar wind proton diffusing into the lunar wake. Futaana et al.[2001] also estimated the potential drop to be 480V from the observation of the electron velocity distributions in the upstream region of the lunar wake.

The potential drop is produced by the ambipolar diffusion of the solar wind plasma into the vacuum region and subsequent two stream instability in the lunar wake. However, only 10 volt potential drop could be generated from previous numerical calculations.

In this paper, we report new results of one dimensional electromagnetic particle simulation in order to confirm and further to understand the previous results. We study the parameter dependence of the potential drop upon the mass ratio, temperature, the fraction of the nonthermal components, and so on to understand what parameters control the value of potential drop in the lunar wake region.