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Double Layers in the Martian Magnetosphere

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Solitary waves are ubiquitous in space and astrophysical plasmas. However, the scope of their observations is limited to the plasma environment around Earth. Besides Earth, Mars is the planet with the most planetary missions. As Mars does not have a global magnetic field, solar wind directly interacts with the atmosphere of Mars, forming a mini induced magnetosphere. NASA's MAVEN (Mars And Volatile EvolutioN) mission provides an opportunity to explore its upper atmosphere. Its orbit is highly elliptical such that it covers ionosphere-magnetosphere region. It measures one component of the electric field and all three components of magnetic field, which is essential for studying plasma wave activities. Recently, the presence of bipolar solitary waves has been reported in the magnetosheath of Mars [1, 2]. In this paper, we present the observation of double layers in the Martian magnetosphere. Double layers are unipolar electric field structures travel along the magnetic field. These double layers are observed on the duskside magnetosheath between 3800 and 4400 km altitude. The characteristics of double layers associated with altitude, local time, and the processes related to their generation mechanisms will be discussed.

References:

[1] Kakad, B., Kakad, A., Aravindakshan, H., & Kourakis, I. (2022). Debye-scale Solitary Structures in the Martian Magnetosheath. The Astrophysical Journal, 934(2), 126. https://doi.org/10.3847/1538-4357/ac7b8b

[2] Thaller, S. A., Andersson, L., Schwartz, S. J., Mazelle, C., Fowler, C., Goodrich, K., Newman, D., Halekas, J., Pilinski, M. D., & Pollard, M. (2022). Bipolar Electric Field Pulses in the Martian Magnetosheath and Solar Wind; Their Implication and Impact Accessed by System Scale Size. Journal of Geophysical Research: Space Physics, 127(7). https://doi.org/10.1029/2022JA030374.