

ESTIMATION OF DOUBLE LAYERS AND PHASE-SPACE HOLES AT THE VENUS MAGNETOSPHERE DURING ITS 4TH ENCOUNTER WITH THE PARKER SOLAR PROBE.

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Introduction: The magnetosphere of Venus is induced by the time-dependent Interplanetary Magnetic Field (IMF) from the Sun. This IMF induced magnetic field opposes the incoming solar wind which increases hot and turbulent plasma at the dayside bow shock and magnetosheath region. The dayside bow shock distance from the surface of Venus is almost one Venus radius [1]. This induced Venus magnetosphere exhibits features such as bow shock, magnetosheath, magnetotail similar to magnetized planets such as the earth. The paper observes the presence of different kinetic structures associated with plasma instabilities at the Venus induced magnetosphere for a dimension below proton Larmor radius. These kinetic structures are related with the heat transfer and particle accelerations [2], emissions of radio waves [3], wave-particle energy exchange [4] at different parts of the magnetosphere. These structures have already been found in different parts of the earth's magnetosphere [5][6]. But for the other planets, observations of these structures have not yet been documented that much because of unavailability of high cadence data.

Methodologies and Findings: The orbit of NASA's Parker Solar Probe (PSP) is designed in such a way that it needs gravity assists from Venus to reach closer distances towards the Sun. The gravity assists are planned inside one Venus radius from its surface. Thus, during these encounters, it can characterize the Venus magnetosphere using its high resolution data. The study was conducted using the high resolution burst mode data from PSP FIELDS instrument [7][8][9] during its 4th encounter with Venus magnetosphere on February 20, 2021 (~19:57-20:21UT). During this encounter, this can be observed that PSP went through the magnetosheath to magnetotail using FIELDS magnetic field strength information and Solar Wind Electrons Alphas and Protons (SWEAP) [10] ion and electron energy flux data. Presence of kinetic structures such as Double Layers (DL) is estimated using FIELDS AC burst mode electric field data mainly when the spacecraft was at the magnetosheath region. The presence of nearby Phase-space holes is also estimated near some DLs during this period. Absence of these features at

the magnetotail region is also noted from these observations.

Acknowledgments: Authors thank to the PSP FIELDS team for providing data (PI: Stuart D. Bale, UC Berkeley). Authors also thank SWEAP team for providing data (PI: Justin Kasper, BWX Technologies). Authors thank Dr. Anthony Case, Smithsonian Astrophysical Observatory for helping in analyzing the data. Parker Solar Probe was designed, built, and is operated by the Johns Hopkins Applied Physics Laboratory as part of NASA's Living with a Star (LWS) program (contract NNN06AA01C). PSP FIELDS data was available from <https://fields.ssl.berkeley.edu/data/>.

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