EPSC Abstracts,
Vol. 2, EPSC2007-A-00058, 2007
European Planetary Science Congress 2007

The physics of the plasma sheath with application to the STEREO spacecraft

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When a body with conducting surface is immersed into a plasma, the zone near the surface is affected by the existence of the surface. This zone is called plasma sheath, a phenomenon which is inherently non-linear and may affect measurements conducted in the plasma. There exist two different types of plasma sheath, depending on the charging of the surface. A natural application of the theory describing the plasma sheath phenomenon is a spacecraft operating in the presence of space plasma. The plasma sheath can affect the properties of scientific antennas. These effects can be used to measure certain plasma parameters by means of a Langmuir probe. Equations modelling the plasma sheath are derived and applied to the STEREO spacecraft and the STEREO/WAVES antennas.