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Techniques for Measuring Surface Potentials in Space

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Materials exposed to the space plasma environment charge to a net potential relative to the ambient plasma. The charging process is due to differential currents to the material surface that results in a net surface charge density. While this process is termed “spacecraft surface charging” when applied to aerospace hardware, it also applies to the surfaces of astronomical objects in direct contact with the space plasma environment including a number of planetary bodies, asteroids, and dust particles. The ability to measure surface potentials is important to many techniques used in conducting fundamental heliospheric science, spacecraft engineering operations, and space technology development activities. This presentation provides a survey of current technologies used to measure surface potentials of spacecraft and planetary bodies with examples of their application to space science and technology programs.