

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

Author: Ms. Eman AbuZeitoun
Jordan University of Science & Technology, Jordan

Ms. Renad Abuzetun
Jordan

Mr. Mazen Abunajem
Jordan

Ms. Lujain Abuzeitoun
Jordan

ENHANCING SATELLITE SUSTAINABILITY THROUGH PASSIVE DUST MITIGATION DEVICES

Abstract

As humanity ventures further into space exploration and satellite deployment, ensuring the sustainability of space activities becomes paramount. Dust accumulation on satellite surfaces poses a significant challenge, affecting performance, longevity, and mission success. In response, passive dust mitigation devices offer a promising solution, harnessing the natural electrostatic charge present on satellite surfaces to repel or remove dust particles without requiring active power sources.

Electrostatic grids and brushes represent two key passive devices utilized in this approach. Electrostatic grids generate an electric field that repels charged dust particles, while brushes physically sweep away dust. These devices operate on the principle of inducing an electrostatic charge on the satellite's surface and the dust particles, causing them to experience electrostatic forces and adhere to the conductive elements.

The continuous cleaning action of these devices ensures the prevention of dust accumulation as the satellite moves through space. Moreover, their minimal power consumption and environmentally friendly materials contribute to overall sustainability. These devices can be strategically integrated into satellite design, positioned in areas prone to dust accumulation, such as solar panels, radiators, or optical surfaces.

In this abstract, we present the operational principles, design considerations, and environmental benefits of passive dust mitigation devices for satellite sustainability. By effectively managing dust accumulation, these devices pave the way for enhanced performance, extended operational lifetimes, and reduced environmental impact in space. Join us in exploring the potential of passive dust mitigation devices for responsible space exploration and sustainability.