ソーラー電力セイル搭載の大面積薄膜ダスト計測器による惑星間塵および木星トロヤ群微粒子環境計測

Meteoroid Environment Measurement during the Interplanetary Cruising and in the Jupiter Trojan Region by the ALADDIN-2 Dust Detector onboard the Solar Power Sail

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The IKAROS-ALADDIN was the world’s largest PVDF-based micrometeoroid detector and successfully observed the distribution of >10 micron-sized dust particles between the Earth and Venus orbits in 2010-11. For the Solar Power Sail to Jupiter Trojan asteroids, we have improved the sensor design and signal processing of the dust detector as ”ALADDIN-2”, based on lessons learned from the development and operation of its first generation.
We hereby report current status of these advancements and applications of the ALADDIN-2. At the IKAROS-ALADDIN sensors, stapler-type terminal connectors were employed in combination with stitching by Kevlar threads. For increasing the robustness of terminal connection over a decade of the Solar Power Sail (SPS) mission duration, grommet-type terminal with washer will be used at ALADDIN-2. For better mass estimation of impacting meteoroids, signal integration circuit is added to the ALADDIN-based electronics so that it sums up values of multiple peaks of an impact signal that are related to meteoroid mass and impact velocity. As for the SPS, the ALADDIN-2 sensors of about 4-5 m^2 will be mounted on the sail membrane, i.e., an order of magnitude larger than that of the IKAROS-ALADDIN, for effective detection rate of decreasing meteoroid flux against heliocentric distance. Also slow velocity impacts on the same detectors will be processed their impact signals by a newly dedicated electronics unit for better understanding the meteoroid environment nearby Jupiter TTrojan astetoids after the spacecraft rendezvous. Both hypervelocity and slow velocity impact calibration tests are currently in progress.

キーワード：Jupiter Trojans、Solar Power Sail、Slow Velocity Impacts
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