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Author: Dr. Hansheng Zheng
Sichuan Institute of Aerospace System Engineering, China, zhs8962@163.com

Dr. Yi Zuo
Sichuan Institute of Aerospace System Engineering, China, nkzuoyi@foxmail.com
Dr. Minghui Cai
National Space Science Center (NSSC), Chinese Academy of Sciences, China, caiminghui@nssc.ac.cn
Dr. Zhenlong Zhang
National Space Science Center (NSSC), Chinese Academy of Sciences, China, zzl@nssc.ac.cn
Prof. Jianwei Han
National Space Science Center (NSSC), Chinese Academy of Sciences, China, hanjw@nssc.ac.cn
Mrs. Yuehai Chen
Sichuan Institute of Aerospace System Engineering, China, lelechen8@qq.com

# INTERNAL CHARGING ANALYSIS OF SMILE MISSION

**Abstract**

The Solar wind Magnetosphere Ionosphere Link Explorer, or SMILE, is a joint space mission between the European Space Agency (ESA) and the Chinese Academy of Sciences (CAS). The mission aims to build a more complete understanding of the Sun-Earth connection by measuring the solar wind and its dynamic interaction with the magnetosphere. According to plan, SMILE will firstly be launched into an initial Low Earth Orbit (LEO) or Sun-synchronous Orbit (SSO). After being tested, it will finally enter a Highly Elliptical Orbit (HEO) by orbital maneuver. After launch, the satellite will be confronted with severe energetic electron environment which poses internal charging threat to dielectric materials and components onboard. In this work, the electron environment that SMILE will encounter in different orbits are surveyed. Several typical space-used dielectrics are selected as examples and internal charging simulation are performed. The results show that SMILE will be faced with internal charging hazard of various degrees during its whole life. Before orbital transfer, the charging of exposed dielectrics of the satellite in initial orbit LEO/SSO should be paid attention to. When entering into its final operation orbit HEO, SMILE will suffer a higher internal charging risk than the typical charging-threatening orbit GEO. During SMILE's orbital transfer period, it will encounter the most severe electron environment, even worse than HEO. Despite the short duration (several days) in this region, it is enough to cause serious internal charging problem if appropriate measures are not taken.