Paper ID: 45504
oral

51st IAA SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES (D5)
Prediction, Testing, Measurement and Effects of space environment on space missions (3)

Author: Mr. Hiroshi Fukuda
Kyushu Institue of Technology, Japan

Ms. HORYU-IV Team
Japan
Dr. Hirokazu Masui
Kyushu Institute of Technology, Japan
Dr. Minoru Iwata
Kyushu Institute of Technology, Japan
Prof. Kazuhiro Toyoda
Kyushu Institute of Technology, Japan
Prof. Mengu Cho
Kyushu Institute of Technology, Japan

HORYU-IV FLIGHT RESULTS OF SPACECRAFT PLASMA INTERACTION EXPERIMENTS

Abstract

HORYU-IV is a 30cm cubic satellite with an approximate mass of 10kg. The satellite was successfully launched by a H2A rocket to an orbit of 575km attitude with 31o inclination on February 17, 2016. Since then, HORYU-IV has been conducting various flight experiments related to spacecraft plasma interaction. HORYU-IV implements HORYU-II, the previous satellite operated from 2012 to 2017, high voltage photovoltaic power generation technology and uses it to perform research on discharge phenomena. HORYU-IV's main mission is to acquire an arc current waveform by an onboard oscilloscope and capture its image by a camera triggered by the oscilloscope. In addition, HORYU-IV carries out scientific experiments on arc-mitigation high voltage solar array, plasma measurement using a double Langmuir probe, vacuum arc thruster, photoelectron current measurement, and polymer material degradation. HORYU-IV captured various discharge waveforms and images in space that can be categorized into several types. Ground experiments were carried out to compare the waveforms between the flight results and the ground results. The Double Langmuir probe was operated in space and its result was compared with the computer simulation result. Photoelectron emission yield was measured for several material for the first time in orbit. The overall results obtained in the past two and a half years from the spacecraft plasma interaction experiments will be presented.