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DEVELOPMENT OF A NOVEL SPHERICAL LANGMUIR PROBE FOR CUBESAT IN ORDER TO
SCIENTIFIC OPPORTUNITIES OF EXPLORATION BEYOND LEO

Abstract

The Langmuir probe has been commonly used as a research payload on CubeSat for low earth orbit (LEO) for in-situ observation or investigation of ionospheric characterization. This work presents a novel spherical Langmuir probe to use in CubeSat application for a scientific opportunity of exploration beyond LEO. In a laboratory chamber that simulates plasma densities close to those in the lower ionosphere, the probe is tested and calibrated. Additionally, the functionality of probe is verified through the on-ground based experiments under various temperature conditions. The proposed spherical Langmuir probe module's design effectiveness and structural safety were validated through qualification-level launch vibration and in-orbit environment tests.

Keywords: Langmuir probe, CubeSat, Ionosphere, Space Plasma, Launch Environment