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DESIGN AND DEVELOPMENT OF AN ADCS TEACHING PLATFORM FOR EDUCATIONAL SMALL SATELLITE

Abstract

The APSCO SSS project is initiated by the Asia-Pacific Space Cooperation Organization (APSCO). This project consists of one micro-satellite (SSS-1) and two cube-satellites (SSS-2A and SSS-2B). The SSS-1 has several missions, such as the demonstrations of the deployment of the coilable mast, the ADS-B technology and the remote sensing. In addition, most importantly, the project objective is to provide an educational satellite platform for students from different countries. The attitude determination and control subsystem (ADCS) is not only an important part of satellite system, but also an typical teaching content. As an educational small satellite, the SSS-1 was launched on 14th October 2021. Subsequently, it is very important and necessary to design and develop an ADCS educational platform for the SSS-1, by which the students can easily master satellite testing methods and improve the design ability. The design and development of an ADCS educational platform involves a lot of issues and faces challenges. For examples, 1) how to design control strategies and methods suitable for engineering applications? 2) how to implement the hardware-in-loop (HIL) test of ADCS platform? and 3) how can the design approach be compared with in-orbit SSS-1 satellite data. Thus, the purpose of this paper is to provide related solutions and describe the details of design and development.