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APPLICATIONS OF CUBESAT WITH ULTRAVIOLET CAMERA TO TECHNOLOGY VALIDATION
OF OPTICAL MODULE SPACECRAFT AND SCIENTIFIC RESEARCH ON STARS AND
EXOPLANETS

Abstract

CubeSat has been demonstrated to applications to either technology validation or scientific research. In order to make full use of its capabilities, A 3U CubeSat is designed with a payload of ultraviolet camera, which aims at technology validation for large spacecraft as well as scientific research on stars and exoplanets. First, the CubeSat is designed to verify the technologies which will be used for the optical module spacecraft of China space station. The optical module spacecraft is scheduled to be launched in 2022 or so, which has 2m-diameter main optical system and is expected to carry out astronomical observations in respect of large sky area and seamless spectrum-depth space touring. The CubeSat with ultraviolet camera can be used to verify the ultraviolet imaging, space touring modes, comic ray monitoring, and CMOS camera technologies. Second, the CubeSat is designed to conduct scientific research on solar flare, stella flare and exoplanets observation. The information of position of the source area of the flare, the discharge curve of the flare in the near ultraviolet band, and the intensity of the flare, can be derived from the flare observations using the ultraviolet camera in the CubeSat. Also, two potentially habitable exoplanets are selected to be observed by the ultraviolet camera to get the high precision and high time resolution light curve, which is used to determine whether ultraviolet bursts are occurred so as to evaluate the habitability of the exoplanets. The CubeSat is designed to be deployed in orbit through China space station, which is scheduled to finish building in 2022 or so. The CubeSat has a high precision attitude control system and high data transmission system while no orbit control system. The field of view of the ultraviolet camera in the CubeSat is designed to be small, which is about 2 degree, while the effective aperture is designed to be as large as possible, which is about 50mm. The spectrum band of the camera is from 230nm to 280nm. Hence, the designs of the CubeSat and the ultraviolet camera can meet the requirements of the technology validation and scientific research.