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DESIGN AND TESTING OF DEPLOYABLE TELESCOPE WITH SEGMENTED APERTURE
DEDICATED FOR CUBESAT STANDARD

Abstract

Growing demand for high resolution space imagery, correlated with advancements in hardware miniaturization and data processing capabilities, creates market opportunities for small satellites. Limited by size (which is their main advantage), producers have to reach for clever ideas. Our approach is to launch satellite that meets requirements of CubeSat standard, equipped with deployable optical telescope. Our instrument is designed to achieve nearly meter resolution from orbital attitude 500 km. To meet those expectations we propose deployable space telescope for cubesat satellites, which balances geometrical and optical limitation with small size and low cost of nanosatellites. In this paper we analyze problem of deployable, and independent telescope aperture segments, supporting it by simulations and measurements from current laboratory version of optical instrument. We will introduce a brief history of deployable space telescopes and research about configuration of optical system, and microelectromechanical modules responsible for adaptive elements. We will also briefly introduce problem of mirror co-phasing and wavefront sensing with optical challenges that segmented and deployable apertures introduce. Paper also includes theoretical simulation of optical limits such as PSF and MTF, and section of experimental results of different aperture architecture patterns that fulfil previous assumptions. Our early simulations show that our telescope is capable of achieving resolution of nearly meter from Low Earth Orbit.