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Author: Dr. Chen Xiaoli
Beijing Institute of Space Mechanics & Electricity, China Academy of Space Technology (CAST), China,
cxl_npu@sina.com

DEVELOPMENT STATUS AND PROSPECT OF HIGH RESOLUTION IMAGING CAMERA IN GEOSTATIONARY ORBIT OF CHINA

Abstract

This paper introduces the Status of High Resolution Imaging Camera in Geostationary Orbit of China, gives a development roadmap of the future camera and analyzes the key technologies. On December 29, 2015, GF-4 satellite, the first high resolution optical remote sensing satellite in Geostationary Orbit of China, was successfully launched. As one of the most important optical payloads on the satellite, the staring camera is the first high resolution optical camera in Geostationary Orbit with catadioptric optical system, the VNIR focal plane assembly uses CMOS area array detector and the MWIR focal plane assembly uses HgCdTe area array detector. In order to guarantee the imaging quality, the camera is integrated designed with the platform, mechanical and thermal stability, micro-vibration suppression, long-life and high reliability of mechanisms are considered. The aperture of the camera is become larger and larger with the increase of the resolution. The aperture will reaches 4 meters if the resolution is 5 meters. The camera can use the traditional monolithic aperture optical system, the same technology road with the GF-4 camera. But the optical system with 4m aperture is the key technology, including the design of optical system with large field and long focal length, material and manufacture of large reflector mirror, assembly, adjustment and test of large optical system and etc. When the aperture of the optical system is larger than 4m, given size, weight and launch ability constraints, as well as cost consideration, the traditional monolithic aperture optical system can not satisfy the need. The deployable segmented optics is an effective way to realize large optical system up to 10m diameter. Contrast to the monolithic aperture optical system, the main mirror of the deployable segmented optics is composed with small segments, the mirror is folded when launch and deployed in orbit. Then, the segments are deployed and assembled to a whole mirror with co-phase. This way resolve the problem of manufacture and delivery of large optics, but many technologies need to be researched, including the large deployable mechanism with high-precision, the manufacture and surface active control of small segment mirrors, the alignment of the segments to co-phase, the assembly, adjustment and test of the whole optical system and the detection and adjustment of the wavefront error in orbit.