

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)

Space Structures II Development and Verification (Orbital deployable and dimensionally stable structures, including mechanical and robotic systems and subsystems) (2)

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A COMPREHENSIVE ERROR ANALYSIS OF HIGH-PRECISION DOCKING PROCESS FOR MICRO SATELLITE

Abstract

Spacecraft platforms serving optical systems often require high platform stability requirements, especially for synthetic aperture imaging systems, where multiple sub mirrors are physically spliced in orbit. Meanwhile, the synthetic aperture optical imaging systems generally require splicing in orbit between multiple satellites to complete. In this paper, two typical satellite splicing processes in the splicing system were analyzed. Some non-aberration source errors in synthetic aperture optical imaging systems were also discussed when the spacecraft platform in orbit, including orbital maneuvering, attitude adjustment and solar radiation. Besides, the typical in orbit vibration, thermal radiation, jet propulsion and other working conditions of spacecraft were introduced. The vibration caused by reaction flywheel attitude adjustment, vibration caused by solar panel deployment, and optical distortion caused by imaging of optical systems on the sunny and sunny sides of the spacecraft were discussed. Further, the key factors affecting the imaging of spacecraft synthetic aperture in orbit was analyzed by the model of error transmission process. Both theoretical analysis and model establishment will provide an engineering guidance for the assembly between optical loads and spacecraft, and improve the accuracy of spacecraft synthetic aperture imaging systems in orbit.