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THE KEY DEMONSTRATIONS OF HIGH-PRECISION TWO SATELLITE FORMATION FLIGHT

Abstract

Satellite project SJ-9 for technologies demonstration consists of two satellites, SJ-9A small-satellite and SJ-9B micro-satellite of which the key demonstrations are high-precision two satellite formation flight, high-performance satellite-to-ground integrated imaging technique. First, satellite SJ-9A uses CAST-2000 platform which can support the test of key experiments including electronic propulsion system, high-performance small camera, etc. SJ-9A is about 790kg mass, 357w long-term power and 1350w peak short-term power. The control system is capable of 3-axis stable attitude with determination accuracy of 0.03°, pointing accuracy of 0.1°, attitude stability of 0.001/s. By using carrier phase DGPS method, the measurement accuracy of inter-satellite baseline is less than 10cm and the time-synchronous accuracy is 9ns. When in formation flight, SJ-9A will fly around SJ-9B, and the effective length of inter-satellite baseline is 3km1.5km while the angle between flight plane and local plane is 355°. Satellite SJ-9B employs new-type CAST-100 platform which can support the test of key experiments including LWIR focal-plane-cooled optics, long life stirling cryocooler, etc. As the second satellite of CAST-100 platform, SJ-9B is a microsatellite about 260kg, 270w long-term power, 3-axis stable attitude with pointing accuracy 0.1°, attitude stability of 0.001/s, strong attitude control ability and orbit control capability with delta-v 25m/s. The satellite aim at the target at imaging and aim at the sun ordinarily. SJ-9B carries technical test payloads with about 80kg and 220w power consumption. This paper introduces the overview of SJ-9 project and describe capabilities and applications of the satellite. Through the satellite-to-ground integrated design and effective combination of technical test payloads, the key technologies referred above can be tested on SJ-9. Also the success of SJ-9 can realize the technology of double satellite formation flying based on InSRA, which will approach the high level of the world and fill the technology gap in our country. As the second satellite of CAST-100 bus, SJ-9B is a microsatellite about 260kg, which most test space application for components and electronic parts of spacecraft, and formation flying test with SJ-9A(800kg, small satellite) by GPS and inter-satellite measure. This paper intends to introduce the overview of SJ-9B project and describe capabilities and applications of the satellite. SJ-9B is about 260kg mass, 270w long-term power, 3-axis stable attitude with determination accuracy 0.01 degree and pointing accuracy 0.03 degree, and orbit control capability with delta-v 25m/s. The SJ-9B subsystems are highly composite equipments. SJ-9B carries test payloads with about 80kg and 220w power consumption.