IAF SYMPOSIUM ON ONGOING AND NEAR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Technology Needs for Future Missions, Systems, and Instruments (3)

Author: Dr. Jianfeng Deng
Shanghai Jiao Tong University, China, jfdeng528@gmail.com

Mr. zhiming cai
Innovation Academy for Microsatellites, Chinese Academy of Sciences, China, caizm@microsate.com
Mr. zhang kuoxiang
Innovation Academy for Microsatellites, Chinese Academy of Sciences, China, zhangkx@microsate.com
Dr. Zhongguang Yang
Innovation Academy for Microsatellites, Chinese Academy of Sciences, China, yang_zhong_guang@126.com
Prof. Tao Zhang
China, tzhang@gdut.edu.cn
Dr. Xingjian SHI
Innovation Academy for Microsatellites, Chinese Academy of Sciences, China, shixj@microsate.com

A NOVEL METHOD OF ACQUISITION AND TRACKING BETWEEN THE TWIN SPACECRAFT OF "TAIJI-2"

Abstract

With the rapid development of aerospace technology, the functions and requirements of the payloads of satellites are becoming more and more complex, leading to the increase in the size, cost and risk of satellites. Distributed spacecrafts can complete complex observation tasks through cooperation, information sharing, and coordinated flight among multiple satellites. Satellite-to-satellite (SS) link acquisition and tracking is a prerequisite for distributed spacecrafts to complete complex tasks. This project intends to focus on research on key technologies related to the establishment and maintenance of inter-satellite links in satellite and satellite tracking missions. First, based on different mission scenarios in near-Earth and deep space, the research on high-precision relative pose determination technology between SS to determine the relative uncertainty area. Then, the coupling progressive attitude analytical model of the distributed spacecrafts is established to study multi-space multi-link collaborative attitude planning method. Furthermore, the distributed spacecraft system decoupling dynamics models are built, and o novel multi-degree-of-freedom (DoF), multi-mode drag-free robust control method is proposed. Finally, a simulation demonstration verification system of multi-link acquisition, tracking and maintenance technology will be developed. The achievement of this project can provide a theoretical guide in the acquisition and tracking of multi-laser links under low-low SS gravitational satellite, space gravitational wave detection, low-orbit network constellation, navigation constellation, and high-middle-low-orbit network.