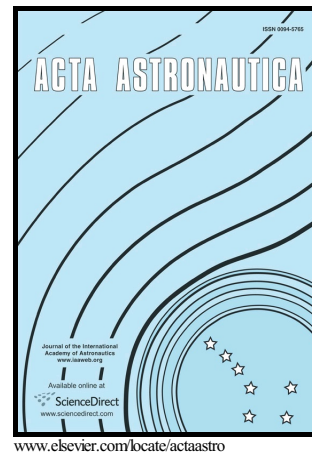


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In-Orbit Assembly Mission for the Space Solar Power Station

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Abstract

The Space Solar Power Station (SSPS) is a large spacecraft that utilizes solar power in space to supply power to an electric grid on Earth. A large symmetrical integrated concept has been proposed by the China Academy of Space Technology (CAST). Considering its large scale, the SSPS requires a modular design and unitized general interfaces that would be assembled in orbit. Facilities system supporting assembly procedures, which include a reusable heavy lift launch vehicle, orbital transfer and space robots, is introduced. An integrated assembly scheme utilizing space robots to realize this platform SSPS concept is presented. This paper tried to give a preliminary discussion about the minimized time and energy cost of the assembly mission under best sequence and route. This optimized assembly mission planning allows the SSPS to be built in orbit rapidly, effectively and reliably.

Keywords: space solar power station, assembly mission design, space robots, sequence planning, route planning

1. INTRODUCTION

The SSPS is a large-scale satellite operating in Geostationary Earth Orbit (GEO) utilizing solar power in space to supply power to an electric grid on Earth. A typical 1-Gigawatt class symmetrical platform configuration was previously proposed by the China Academy of Space Technology (CAST) [1-2]. Electric power is generated by two continuous rotating solar arrays which are connected to transmitting antennas via two power transfer rotaries.

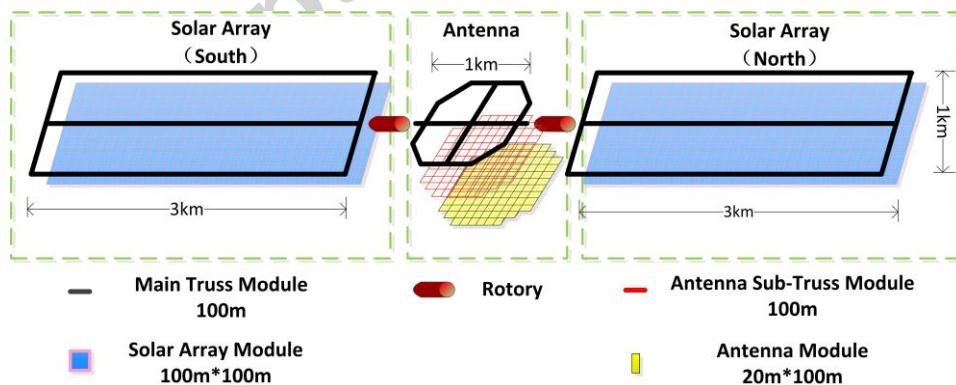


Figure 1: Platform Configuration SSPS.

The whole SPS system includes Solar Energy Collection and Conversion (SECC) sub-system, Power Transmission and Management (PTM) sub-system, Microwave Power Transmission (MPT) sub-system, Structure sub-system, Power Management and Distribution sub-system (PMAD), Attitude and Orbit Control (AOC) sub-system, Thermal Management (TM) sub-system, and Information and System Operation Management (ISRM) sub-system.

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