

SPACE POWER SYMPOSIUM (C3)  
Advanced Space Power Technologies and Concepts (3)

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RESEARCH ON POWER BUS INTERCONNECTION AND POWER CONTROL TECHNOLOGY FOR  
SPACECRAFTS

**Abstract**

Comparing to the satellites, Space Station (SS) is a large-scale and long-life spacecraft orbiting the earth, which needs to be constructed on orbit, which can support astronauts to stay for a comparatively long period. It is a unique place with microgravity, can be used as an ideal environment to conduct scientific experiments relating to different fields. During the period of on-orbit construction and normal operation, due to the sunshade effect of the Modules which are in the docked state, the power system operating mode of certain Modules can be affected, causing them in the state of power shortage. In order to solve this problem, and to optimize the performance of the entire power system of Space Station (SS), and to reduce the weight of Cargo Module and Crew Module, and meanwhile to reduce the budget of the whole project, the entire power system of SS is designed as a whole, and a scheme of installing electrically isolated Power Supplement Controllers (PSC) is introduced for interconnecting the power buses of the docked Modules to supply power mutually when needed. The PSC is modularly designed with the Converter Unit (CU) and its capacity can be increased by CU parallel. The CU has the unique features of high efficiency, the capacity of parallel operation for higher power, output power digital regulation and comprehensive anti-abnormity protections for enhancing reliability. This paper mainly describes the architecture of the entire power system of Multi-Module Spacecrafts (MMS), the power supplementing strategy between the docked Modules, the power bus electrically isolated conversion topology, design of operation modes, output power digital regulation method and design of Fault Detection, Isolation and Recovery (FDIR). Finally, the experimental verification result is provided.