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THE MISSION PLANNING TECHNIQUE AND SOFTWARE DEVELOPMENT FOR SPACE STATION OPERATION

Abstract

The core module of the Chinese Space Station is ready to be launched in 2020. Since the space station is designed to work on orbit for more than ten years, an efficient space station mission planning technique is necessary to guarantee the safety, robustness and utilization benefit of the space station operation. An intelligent operation mission planning system is also required to automatically produce a well-designed planning scheme. Since 2007, our team has been systematically engaged in the pivotal technical efforts corresponding to the operation planning, including modeling method based on ontology theory, heuristic rapid planning strategy and intelligent global optimization algorithm, etc. This paper introduces a mission planning software developed by the authors for the Chinese Space Station, which is aimed to provide schemes for on-orbit activities scheduling and logistics strategy planning. This paper is organized in four parts. Firstly, the conceptual model of the operation mission planning with multiple constraints and metrics is established to describe the problem. Secondly, the main planning methods employed in the mission planning system are presented. Then, the software framework of the mission planning system and data interaction method between planning sub-systems are provided. Finally, the main functions of the system and its application and further improvements are simply summarized.