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A MISSION PLANNING SYSTEM FOR SPACE STATION OPERATION

Abstract

Mission planning systems play a very important role in space station operation. A lot of planning systems and tools have been developed especially for the operation of International Space Station, e.g. the Integrated Planning System and Payload Planning System of NASA, the Operations Preparation and Planning System of ESA, etc. The China's space station is expected to be in orbit in 2020 and the mission planning systems are now in the process of development. The paper introduces one mission planning software developed by the authors which is aimed to allocate the executing times of multiple missions, schedule the corresponding resources, and make arrangements of astronauts on board weekly or monthly.

The paper is organized in four parts. Firstly, the conceptual model of mission planning problem for the space station is established using the ontology theory, which can describe the concepts, constraints and relations of the planning domain formally, abstractly and normatively. Secondly, the main planning methods employed in the mission planning system are described, including conflict-repair methods of dynamic constraints, heuristic algorithm based on time iteration and improved intelligent optimization algorithms. Then, the software framework of the mission planning system and its development method are provided. Finally, the main functions of the system and its application and further improvements are simply summarized.