

SPACE OPERATIONS SYMPOSIUM (B6)
New Operations Concepts, Advanced Systems and Commercial Space Operations (2)

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MOAPS: MISSION ORIENTED AUTOMATED PLANNING SYSTEM FOR ON-ORBIT SERVICE

Abstract

As one of the most sophisticated and complex space missions, on-orbit service contains different types of constraints and needs more collaborative systems, which increases the difficulty of mission planning and makes manual planning time-consuming and error-prone. To solve the problem, the paper designed a mission oriented automated planning system (MOAPS) which is mainly composed of four parts: system model (SM), hierarchical planner (HP), rendezvous orbit planner (ROP) and conflicts revision module (CRM). The knowledge of the on-orbit service field is divided into object, state, action, task and constraint, and the models of them are built according to their physical properties. When a service mission is submitted to MOAPS, it uses the hierarchical planner to decompose the target mission into a network of atomic actions based on the knowledge in system model. Then the action-network will be instantiated into an action-sequence with the support of orbit and timing information provided by rendezvous orbit planner. To ensure the validity of the plan, the conflict revision module is developed to detect and repair conflicts in the instantiated action sequence iteratively until a feasible plan is generated. MOAPS could plan on-orbit service missions of different types. An orbit transfer mission and a distant target capture mission are taken as examples to demonstrate the properties of MOAPS.