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Upper Stages, Space Transfer, Entry and Landing Systems (3)

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AUTONOMOUS OPERATION TECHNIQUE OF UPPER STAGE FOR MULTI-SATELLITE
DEPLOYMENT**Abstract**

As an important part of aerospace transportation system, the upper stage has got more and more attention from aerospace powers. The multi-satellite deployment can be realized through the upper stage. Operations of upper stage usually depends on plans made on ground and uploaded as telecommands. However, when emergency occurs or the upper stage is invisible to staff, the original plans may be unavailable and the upper stage needs to make decision and act autonomously. In order to support the multi-satellite deployment missions in China, this paper pays attention to autonomous operation technique for upper stage, especially autonomous planning technology, to improve the intelligence and robustness of upper stage. Considering strict launching windows of satellites, we propose a time information guided planning method in order to satisfy time constraints. Meanwhile, this method can find a high-quality plan quickly, which can make the upper stage complete a task more efficiently. In this method, state transition graphs related to subsystems of upper stage, such as propulsion system, are used to record time information and calculate shortest path between any two states before planning. In the planning process, actions, which upper stage needs to execute, with lower cost are selected. Finally, experiments on domains about multi-satellite deployment using upper stage are run and the experimental results indicate the effectiveness of our technology