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Author: Prof. jun miao
China, kyle_mzr@sina.com

Mr. chaoyun chen
China, ccy526146458@qq.com

Dr. Ling-bin ZENG
Shanghai Aerospace System Engineering Institute, China, zlbb@126.com

Prof. haipeng qian
China, qianhp2013@sohu.com

ON ORBIT ASSEMBLY SEQUENCE PLANNING OF TRIANGULAR PLATE ELEMENTS BASED ON PARTITION METHOD

Abstract

On-orbit assembly sequence planning is a design process to optimize assembly sequence of all elements to achieve higher precision and efficiency under the constraints of space accessibility, operational feasibility, etc. This paper focuses on the issues of less shifting of structure's gravity center, higher assembly precision and shorter moving path when using a mobile robot to assembly triangular plate elements. The assembly sequence model is constructed by the graph theory and its conclusion indicates the best assembly sequence is a spanning tree instead of a Hamilton chain. Then partition method is adopted to solve the problem of combinatorial explosion that exists in the process to get spanning trees. Finally, the evaluation index including stability, precision and rapidity is generated considering the actuality and the best assembly sequence of each area is selected based on the index which are integrated into the total assembly sequence. It can significantly reduce the planning time, meet the requirements and satisfy the constraint of assembly ability and operation ability.