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STRUCTURE OPTIMIZATION OF BUAASAT BASED ON A COMPOUND TOPOLOGY STRUCTURE

Abstract

BUAASAT is the micro-satellite developed by BeiHang University, which consists of three parts: main-sat, gravity gradient rod and sub-sat. BUAASAT is designed to run on the 600km sun synchronous orbit with the life of 6 months, committed to complete several missions such as verification of semi-rigid gravity gradient rod expansion. Up to now, BUAASAT has been completed with an initial structure. This thesis aims to reduce the mass of BUAASAT by design modification and structural optimization, while based on satisfying constraints and restrictions. The initial design uses multi-layer structure in which the satellite is divided into several parts by shells. However, some shells are relatively thick so that thinner shells with beams under them are introduced to replace original ones. Then, structural optimization is used to arrange the layout of the beams (topology optimization) and determine the specific size of the beams (size optimization).To verify the feasibility of the improvement, FEM model of BUAASAT is established in Msc.Patran/Nastran and Hyperworks according to the new design. The mass of BUAASAT is reduced by more than 60