
Rationale for engineering design characteristics of spacecraft groups based on a probabilistic approach

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The study tested the optimization problem of design and engineering characteristics of spacecraft groups, its solution requiring the probabilistic approach. We evaluated the indicator of the target program performance effectiveness with minimized costs. Moreover, we developed the methods and software to optimize the probability of failure and the redundancy multipleness of on-board systems, as well as the resource, the number of substitutions and the number of redundant spacecraft. While using optimization techniques, we also applied Lagrange methods, as well as search and random search methods. The efficiency of the proposed approach is illustrated by definite examples. The findings of the research can serve as a guide for engineering and technical personnel of enterprises in the development of highly reliable products of rocket and space technology.

Keywords: space group, reliability, resource, redundancy multipleness.

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