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A UNIFIED SCHEME OF A COMMERCIAL SINGLE-TURN SPACE TOURIST OPERATION

Abstract

Rocket-space technology developments make it possible for states to carry multiple satellites into Low Earth Orbits (LEO) and perform regular sub-orbital flights. Increasing number of space vehicles, sub-orbital vehicles, and perspective space tourist flights requires method simulation of bottleneck problem solutions which include anthropogenic objects collisions in LEO and aerospace traffic management with an allowance for possible landing zones. Flight safety of a commercial piloted space tourist vehicle is a vital problem which is closely connected with the lack of unified methodology and quantitative assessment of damages and risks for various scenarios.

The proposed paper intends to give a logical examination of a mathematical model construction base for a commercial single-turn space tourist operation relating to evaluation of its bottlenecks and flight safety.

R. Bellman's methodology for technical-and-economic problems with operational bottlenecks is used to address the flight safety issue for a commercial space tourist vehicle with passengers on a surface – to – orbit and orbit – to – surface single-turn trajectory. The logical analysis of a commercial tourist vehicle operation as a complex technical system is aimed to reveal a tasks solution sequence and correlation between system synthesis particular tasks of a higher level. A line of self-reliant subsystems was identified. The problem under consideration is presented as a hierarchical model according to T. Saaty's methodology. A unified approach to presentation of a commercial single-turn space tourist operation as a hierarchical system has been developed and backed by quantitative estimation of the operational bottlenecks.

This approach enables to estimate efficiency of the commercial single-turn space tourist operation with an allowance for project realizability and to lay down appropriate steps for ensuring operational safety and utilized infrastructure safety.