

Lunar Exploration (3)
Lunar Concepts (3)

Author: Mr. Ilya Smorshko

Central Research Institute of Machine Building (FSUE TSNIMASH), Russian Federation

Dr. George Karabadzhak

Central Research Institute for Machine Building (FGUP TSNIMASH), Russian Federation

Ms. Mariya Danilova

Central Research Institute for Machine Building (FGUP TSNIMASH), Russian Federation

TECHNIQUE OF THE DESIGN-BALLISTIC ANALYSIS OF CONDITIONS OF TECHNICAL
IMPLEMENTATION OF REUSABLE "LUNAR" RUNWAY SPACECRAFTS

Abstract

In the 21st century, there is a need of use of the complex methods matching use of knowledge from various fields of science and technology. In this report, the technique of the solution of a task of the design-ballistic analysis of conditions of technical implementation of reusable "lunar" runway SC (SpaceCrafts) is described and the example of its use in a specific research execution is given. As a result of work the new ratio is received. The developed technique contains two main units: ballistic and design.

Ballistic block

Ballistic calculations provide finding of the relative terminating mass of SC and the relative mass of the spent fuel on the known costs of characteristic speed of realization of this or that fissile operation. The question of determination of characteristic speeds is the most composite and depends on specific problem definition, the chosen scheme of flight, a way of landing, maneuvers and other dynamic operations.

Design block

Depending on a set of input data and purposes of a task, new expression to receive calculated values of such parameters as fuel compartment mass coefficient, design perfection coefficient, mass of a payload, launch mass and different variations of dependences of these parameters from each other and from sizes SC relative terminating mass, fuel relative mass and number of operations. For assessment of a conditions of technical implementation of SC and the maximal frequency rate of the carried-out operations without refueling and other conditions, it is necessary to work with a denominator of a new ratio. In report contain results of the carried-out design-ballistic analysis which are had during the research conducted on the basis of the developed technique. The developed technique of the design-ballistic analysis of a conditions of technical implementation of reusable "lunar" runway spacecrafts is flexible, efficient and convenient "tool" for carrying out researches, can be applied by specialists of branch at projection of SC and students of profile higher education institutions.