
Application of the method of multipliers for the ballistic designing of three-stage carrier rocket

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The article is concerned with the process of three-stage carrier rocket ballistic designing. The nonlinear programming problem is formulated as the achievement of minimum value of the target function with limitations. The target function is the variable inverted to the relative mass of the carrier rocket head compartment. Threshold tells the end of the active portion of the trajectory. In order to work out the conditional extreme value, method of multipliers combined with coordinate-wise method and golden section method are used in both multi-dimensional and one-dimensional case to find unconstrained value optimization. The equations of motion of the carrier rocket are integrated numerically by the Runge — Kutta 4th order accuracy method. Original calculating program was produced using programming language PASCAL. Several test calculations were carried out.

Keywords: *carrier rocket, designing, active portion of the trajectory, conditional extreme, unconditional extreme, method of multipliers, penalty parameter, Lagrange multipliers.*

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