OPTIMIZATION OF FLIGHTS BETWEEN NON-COPLANAR CIRCULAR ORBITS WITH A TWO-STAGE BOOSTER WITH CHEMICALAND ELECTROJET ENGINES

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The paper deals with a flight between the non-coplanar circular near-earth orbits – the initial low orbit and the target high one. Boosters delivering payload to the target orbit are: one-stage and two-stage with a chemical rocket engine, one-stage with an electrorocket engine or combined two-stage with a chemical and an electrrocket.

The optimal law of changing the angle of thrust vector deviation from the orbit plane is obtained on the basis of averaging procedures and maximal principle for a particular case of the orbits' relative position and location of the active site on the loop. The use of this law and analytical expressions makes it possible to reduce the complicated optimization task of payload maximum to a simpler task of searching five-variable function conditional extremum.

Comparative analysis of various kinds of boosters according to the time of flight and the mass of payload is given. The advantages of a combined booster are defined.