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THRUST-VECTOR CONTROL FOR LIQUID ROCKET ENGINE OF SPACE STAGE OF LAUNCH VEHICLE IN CASE OF MASS ASYMMETRY

The results of the development and studies of the thrust-vector control system for a liquid rocket engine to control a space stage of the launch vehicle of the Cyclone-4M-type in case of mass asymmetry are reported. The paper discusses new structural and general-arrangement diagrams of bifunctional systems of the thrust-vector control, based on combined use of the mechanic (swinging the gimballed engine) and gas dynamic (asymmetrical injection into the supersonic section of nozzle of the pressurization gas used by the turbine) thrust-vector control systems. Physical fundamentals for creating controlled efforts, special features of algorithms of the thrust-vector control and the stage motion control are examined. It is shown that applications of bifunctional systems of the thrust-vector control allow for significant extending the range of the thrust-vector control on retention of a high dynamic quality of the stage flight control and its power-mass and overall dimensional characteristics.

Keywords: *flight control, liquid rocket engine, engine chamber swinging, asymmetrical injection, bifunctional system of thrust-vector control, control range, stability region.*

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