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V. V. GORBUNTSOV, A. N. ZAVOLOKA, N. F. SVIRIDENKO

ACTIVE FLIGHT CONTROL FOR LAUNCH VEHICLE: A NEW APPROACH AND RATIONAL WAYS FOR ITS REALIZATION

To provide a safe operation of a launch vehicle (LV) and to use effectively its onboard service life, the rational ways for forming the algorithm for an active flight control are examined based on the LV status monitoring data. During the LV disturbed flight it results in stabilization of the motion of an elastically deforming launch vehicle and the operation of its engine. As an object of control for the proposed system of the active flight control, we consider the LV elastically deforming in-flight body (in relation to the control of its bending vibrations) and a hydraulic dynamic situation into the fuel tanks (in relation to the control of the free gas inclusions into the fuel tanks). The active control of the LV body status is achieved by sustaining the form of a flexible centerline of the body in the predicted limits by using readings of a limiting number of strain-gauge transducers. The active control of the free gas inclusions in liquid-propellant components at inlet of fuel lines of the LV engine is realized excluding the penetration of the free gas inclusions into fuel lines to the extent that may result in a disturbance of the normal operation of pumps. Thus, the problem of status monitoring the parameters of a variable field of pressures through propellant components in fuel tanks is solved as a problem of recovery of pressure fluctuations modes by using readings of the strain-gauge transducer mounted at the fuel tank bottom.

Keywords: *launch vehicle, active control, phenomenological approach, status monitoring, elastically deforming body, flexible axial line, fuel tank, hydraulic dynamic situation, free gas inclusions.*

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