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**S. S. VASYLIV, N. S. PRYADKO**

# COMPUTER SIMULATION OF GAS-DYNAMIC PROCESSES FOR ROCKET FAIRING DESIGN OPTIMIZATION

*Institute of Technical Mechanics*
*of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine*
*!5 Leshko-Popel St., Dnipro 49005, Ukraine; e-mail: gl_konstruktor@ukr.net*

The fairing serves to protect the payload against exposure to external factors during the rocket flight. It must withstand considerable force and thermal loads and safely detach and move away from the rocket. This paper deals with the process of fairing flap separation from the rocket in the Earth's dense atmosphere under conditions of considerable aerodynamic loads in the range of supersonic flight speeds. It is proposed that flap removal from the rocket structure be done using a detonation corded rocket engine, which develops a considerable thrust at a low mass and a short operation period. This significantly reduces the fairing mass. The forces arising in this process were determined by computer simulation. A technique for calculating the basic parameters of a detonation corded rocket engine for fairing flap removal is presented. The mathematical model of flap motion relative to the rocket during the process of detachment and removal consists of two parts: the calculation of the separation and acceleration of the flaps while in mechanical contact with the rocket and the calculation of the inertial motion of the flaps separated from the rocket. The computer simulation gives the projections of the aerodynamic forces and torque and the air pressure distribution for the most characteristic angles. Five protective partition shapes were simulated: conical, concave conical, spherical, concave spherical, and flat. The concave spherical shape was found to be optimal in terms of minimum energy consumption. The optimal shape, dimensions, and placement of the partition were calculated. The minimum thrust of the detonation corded engine required for flap removal from the rocket was determined, and effects that allow one to reduce this thrust were found. The calculated pressure distributions may be used in flap strength analysis.

***Keywords:*** *detonation corded rocket engine, supersonic flow, fairing separation, simulation, pressure distribution*

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