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MECHANICAL BEHAVIOR RESEARCH FOR AIR-GROUND INCONSISTENCY OF SOLID ROCKET MOTOR

Abstract

To obtain the factors that cause the differences between standing tests and flight tests of a solid rocket motor. First aiming at the pure gas phase internal flow field, three dimensional conservation equation, compressible, S-A equation were used to conduct some numerical calculations. Then as to the gas-solid two phase internal flow field, Euler equation was used to describe the gas phase and Lagrange equation was used to describe the particle phase, lots of gas-solid two phase flow numerical simulations were conducted. And the last, the structural integrity of the rocket motor was studied as flow field results be the boundary conditions. The results show that, the kinematic velocity of particles will increased for the effects of axial overload, which bring out a more serious ablation phenomenon for the adiabatic layer at end of the combustor; passive movement characteristics of solid particles will be worse as the increase of the particles' diameter, and the particles will be easier to form high concentration gather stream which washout the end of the combustor; the acceleration load have little effects to structural integrity of the rocket motor, while near to the end of motor's working, the mechanical property of interfacial adhesion and adiabatic layer will be worsen sharply due to the decrease of the grain's thickness, therefore, the adiabatic layer and the interfacial adhesion will be easier destroyed due to the high pressure draft and the scour of high-speed solid particles.