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SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Interactive Presentations (IP)

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MULTICONDITIONAL LOAD VARIABLE AREA NOSE (MCL-VAN)

Abstract

Re-entry vehicle processes through extremely high energies involved (kinetic energy due to speed and potential energy due to position). These energies are dissipated as heat and transfer of heat in this aspect plays an important role.The extent of drag force needed for deceleration depends upon the drag coefficient. The rate at which drag dissipates energy is proportional to the vehicle geometry, drag coefficient and the Velocity. Aerodynamic heating rate is a strong function of the radius and length of the projected surface and signifies that the nose geometry and design form an essential part of safer re-entry. Conical nose shape was thought to be efficient and were replaced with the blunt body concept accepted throughout the world and blunt cones were used in all re-entry vehicles. Vehicle aerodynamics correlated minimum drag bodies like Von Karman Ogive shape to yield best across the board performance and directed modern rocketry to generally have ogive nose cones. However, with the appreciable work from nose shapes to heat shields, the excessive heating issue owing to reduced deceleration is yet to be comprehensively addressed. This has necessitated the active research effort to optimize the nose shape of the re-entry vehicle for effectual procedure. So, a study for optimization of nose shape for effective deceleration was carried out. The work investigates utility of different nose shapes for efficient and safer re-entry operation. A novel design "Multi conditional load variable area nose (MCL-VAN)" is proposed to address the re-entry issue. It represents an auto adjustable nose with stretch out area, optimized, better performance as per varying atmospheric requirements and more effective than the existing. Special feature includes simplicity, easy incorporation, controllable (manually and electronically) and flexibility of usage.