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SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 3 (3C)

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CONCEPTUALIZATION OF DESIGN MODIFICATIONS IN RE-ENTRY VEHICLES - VECTORING FOR REDIRECTION OF PLASMA

Abstract

NASA's Jet Propulsion Laboratory continues to push the boundaries of entry descent and landing with heavier exploratory systems. Our heatshields must dissipate more the 90

The data gathered indicated the urgent need for an optimized entry design increasing the marginal probability of safety. The Reentry dynamics is invariably dominated by the drag coefficient, frontal Area, angle of attack, density of atmosphere, ballistic coefficient and many other less significant parameters. The most popular design produced for the same is the 70 blunted cone design with angle of attack of about 12 to 13 to obtain the optimum value of CdA so as to increase drag and frontal area. The STARSHIELD concept adopted in this technology demonstration will redirect and vector the surrounding plasma by using nozzles built into the shield to allow propulsion free adjustments to trajectory, thereby reducing the velocity during Re-Entry. To obtain the same, supersonic and hypersonic diffusers are strategically mounted along the aeroshell of the vehicle. The general function of diffusers for hypersonic speeds as applied to the STARSHIELD design is presented in the context of modifications to the classic methodology of Doctrine of Successive Refinement (DSR) for its' development. This concept is universal in the sense it can be employed for non – axis symmetric vehicles as well. A vectorable aeroshell will help compensate for wind shear, provide course directional capabilities and reduce shockwaves across turbulent boundary layers associated with TPS degradation in flight. These capabilities will revolutionize the entry, decent and landing on Mars enabling ever larger payloads to its surface.