

SPACE EXPLORATION SYMPOSIUM (A3)  
Mars Exploration – Part 1 (3A)

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DESIGN SPACE EXPLORATION OF AN ISOTENSOID INFLATABLE AERODYNAMIC  
DECELERATOR**Abstract**

Inflatable aerodynamic decelerators (IADs) were developed in the late 1960's and early 1970's prior to the Viking missions. However, IAD technology has not undergone significant research in the 30 years since their initial development. The isotensoid IAD represents a technology that can relax limitations imposed by heritage supersonic parachutes by improving the aerodynamic drag of the decelerator system at higher Mach numbers. This work presents a design space exploration of isotensoid shapes on a 4.8-m diameter sphere-cone aeroshell similar to that used by the Mars Science Laboratory. Structurally derived isotensoid shape equations are integrated through a range of design variables and each configuration is evaluated on the metrics of drag coefficient and surface area. Geometric trends and performance characteristics of the various isotensoid designs are presented.