HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Mars Exploration (2)

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NUMERICAL STUDY OF ENTRY INTO MARTIAN ATMOSPHERECONSIDERING CHEMICAL REACTIONS, AEROTHERMODYNAMICS AND APPROPRIATE GEOMETRIC CONSIDERATIONS BEST SUITABLE FOR MANNED MARTIAN ATMOSPHERIC ENTRY MISSION

Abstract

In the present age of mars exploration through robotic interphase which has already entered Martian land and exploring the many interesting aspects of our neighboring planet, the interests and expectations are soaring high. It is always felt comfortable to deal with men with specific task than to control robots to complete tasks to meet our interests. Hence, this paper provides a detailed analysis of various aspects that will be essential to initiate a manned mission to mars for exploration. Manned mission to mars is more complex as it involves lives of people and survival of people while entering an alien atmosphere. The primary aim of this paper is to design an entry capsule which is suitable for manned mission that is to design a module which can handle surface heating in the most effective manner to avoid disintegration during atmospheric entry. Certain proven design modifications such as forward facing cavity at the nose of the capsule, eccentric design to avoid flatness of surface, multiple cavity regions on the module geometry for reduced heating and many such design considerations have been made to provide the best suitable design for entry into mars. Secondly several fully three-dimensional Computational Fluid Dynamics analyses have been performed to assess the flow field environment around the vehicle to address the aerodynamic performance of the entry capsule. A wide range of flow condition which include reacting flows, different angle of attacks an Mach numbers have been investigated. Chemically reacting flows are simulated using CFD tools considering atmospheric composition of mars consisting 95.7