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THE PROPOSAL OF MARS AERO CAPTURE TECHNOLOGY DEMONSTRATION MISSION.

Abstract

This paper indicates examination of aero capture demonstration plan and system in assumption of sub-payload launch chance as deep space exploration. Aero capture demonstration system is necessary to have form transformation performance with hardware to satisfy system requirement of both thermal control function in steady situation under deep space cruising and unsteady excessive heat transfer input environment by the entry aero dynamic heating at the mission phase of aero capture. The final purpose of this mission in a demonstration of aero capture technologies is first challenge of Mars aero capture demonstration of technologies in the world. The aero capture technology which planetary atmospheres over the earth. The mission sequence is the first challenge, but demonstration system is assembled to be heritage components, which is consisting of five engineering elements. The contribution and improvements point is by this result is aims at the technical acquisition and succession turned to future planetary atmosphere entry, descent and landing missions containing a manned Mars mission by using as planets in solar system, and also it is assumed to be carried out as the planets of future manned expedition. The demonstration system needs to have a steady thermal control function under deep space cruising, and the heat resistance and heat insulation function to the unsteady excessive heat flux by the aerodynamic heating at the time of missions. Therefore, the inside of missions has the heat shield constituted like huge umbrella shaping shield combined materials by the atmosphere entry side, and takes the capsule type form which stops the heat flux. Moreover, during deep space cruising, 180 degrees of heat shields are developed power generation side by the heat dissipation side and a solar cell, the antenna for communication link reservation, and attitude determination and control by reaction control system are exposed outside. Structure consists of aluminum honeycomb form and the fuel tank is installed in the central part. It is mass at the fuel maximum loading budget is 250 kg. Electric power generation is 250W at the maximum, and the solar cell for supplying this is stuck on the heat shield rear side. A communication link has non-directional low gain antenna and medium gain antenna for high precision orbit determination for the communication reservation at the time of early segregation or posture loss. Orbit control mainly assumes the adjustment manoeuver at the time of the earth SWB, and the rise manoeuver after aero capture.