

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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INTERMEDIATE EXPERIMENTAL VEHICLE, ESA PROGRAM EXTRAPOLATION GROUND TO
FLIGHT WIND TUNNEL AND CFD APPROACH

Abstract

With the aim of placing Europe among the world's space players in the strategic area of atmospheric reentry, several studies on experimental vehicle concepts and improvements of critical reentry technologies have paved the way for the flight of an experimental space craft. The Intermediate eXperimental Vehicle (IXV), under ESA's Future Launchers Preparatory Programme (FLPP), is the step forward from the successful Atmospheric Reentry Demonstrator flight in 1998, establishing Europe's role in this field. The IXV project objectives are the design, development, manufacture and ground and flight verification of an autonomous European lifting and aerodynamically controlled reentry system. The design of reentry spacecraft requires the prediction of the aerthermodynamic characteristics for high altitude / high velocity conditions which cannot be duplicated in ground facilities. Aiming to reduce uncertainties linked to the extrapolation process, strategy based on wind tunnel and CFD data is considered. The paper will describe the general strategy, the ground prediction tools involved like ONERA S4ma, F4 high enthalpy facilities as well as CFD code from RTECH, CFSe and Dassault Aviation. The main results will be discussed with emphasis on the pre-flight uncertainties for IXV application.