

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

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CONCEPT STUDY OF AN ATMOSPHERIC REENTRY USING A WINGED TECHNOLOGY
DEMONSTRATOR**Abstract**

In the framework of the Unmanned Space Vehicles (USV) programme, the Italian Aerospace Research Centre (CIRA) is conducting a dedicated research project aimed at developing key technologies for future reusable launch vehicles. The main focus of the USV programme is primarily centred on aerodynamic and aerostructural behaviour and on advanced GN&C systems for transonic, supersonic, and hypersonic flights. To this end, CIRA is conducting a concept study of a re-entry mission using a winged technology demonstrator (FTBX) that will be launched and inserted into LEO orbit using VEGA, the newly born European launcher. Starting from previous studies carried out on a similar vehicle configuration, flight mechanics analyses have been performed with reference to the entry phase of flight, i.e. from orbital conditions down to the Terminal Area Energy Management interface, by investigating an innovative guidance strategy based on a long-endurance re-entry flight. The objective of this preliminary study is to assess mission versatility in terms of minimum and maximum achievable downrange, with a given vehicle configuration in order to guarantee adaptivity of the trajectory to off-nominal conditions at entry interface and/or possible changes of landing site. In addition, the analysis of the re-entry performance was also aimed at identifying and suggesting possible vehicle configuration changes that could improve the vehicle's characteristics especially in the critical phases of the flight.