

Key Technology of Space Exploration (8)

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## PERFORMANCE COMPARISON OF TYPICAL LIFTING MARS ENTRY VEHICLES

### **Abstract**

The deceleration of the entry vehicle and precision landing on the planetary are some of the key challenges during Mars entry, descent and landing (EDL) missions. Compared with ballistic entry, guided lifting vehicles will achieve sufficient deceleration and precision landing by utilizing aerodynamic forces to aeromaneuver through the Martian atmosphere. Variations in geometry configuration for lifting entry vehicles will affect the trim angle of attack, lift-to-drag ratio, ballistic coefficient and the corresponding descent trajectory during the EDL mission. The present work analyzes the aerodynamic characteristics and landing performances of three typical lifting Mars vehicles, Mars Science Laboratory (MSL), SpaceX's Red Dragon space capsule and Orion Multi-Purpose Crew Vehicle (MPCV), and the impact of geometry configurations on the performances of Mars lifting entry vehicle are discussed.