

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Upper Stages, Space Transfer, Entry and Landing Systems (3)

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APPLIED MAGNETO-AERODYNAMICS FOR SAFER RE-ENTRY OF SPACE VEHICLE.

Abstract

The space vehicle re-entry is the most crucial stage in manned space missions. During re-entry, the vehicle speed is more than mach 20 which poses high risk to failure. This paper discusses about reducing its speed during this stage using Magneto-aerodynamics. Two sets of electron ejector-collector combination coupled with two electromagnets are installed in each wing. Air, heated due to the formation of shock waves, passes over this combination and gets ionized due to ejection of electrons from the ejector. This results in a flow of electric current from the collector to the ejector. The coupled transverse magnetic field acting in upward direction interacts with the current flow inducing a mutually perpendicular force whose direction, according to Fleming's left hand rule, is opposite to the air flow. This induced force has compressing effect on the incoming air, thus increasing its density which results in increase of pressure drag. This causes effective reduction in velocity of the vehicle and a safer re-entry.