

IAF SPACE EXPLORATION SYMPOSIUM (A3)  
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SLOTTED WING CONFIGURATION FOR MICRO – UAV’S DESIGNED FOR FUTURE  
PLANETARY EXPLORATION

**Abstract**

Planetary discovery is currently focused on vehicles that are land based. Land based rovers are constrained to a limited area due to mobility and terrain issues and tend to be slow.

The paper proposes the use of Micro Unmanned Aerial Vehicles (Micro-UAV’s) in planets that have a atmosphere less denser than Earth, like Mars. Micro-UAV’s will not be restricted to land based mobility and terrain issues. The current generation of Micro-UAV’s cannot be readily deployed without modifications, due to low atmospheric pressure in Mars. The proposed solution aims to improve aerodynamic performance by using leading edge slots in Micro-UAV’s wings as a replacement to the current wings. The modification is expected to generate sufficient lift in Martian atmosphere.

The strategy uses slots to enhance the wing’s aerodynamic efficiency through boundary layer modification. A leading edge slot directs the flow of air from the bottom of the wing through the slot. The outflow of air from the other end of the slot provides additional momentum to the air molecules, thus forcing the flow separation closer to the trailing edge of the wing. The delay in flow separation enhances the aerodynamic efficiency by a significant factor.

This is a passive approach to support flight without the use of external power supply for boundary layer control. Using Micro-UAV’s for planetary exploration is beneficial as it allows maneuvering and flexibility during operation. The implementation of the slotted wing concept will lead to efficient exploration assisting manned or unmanned missions. The paper will research, study and analyse different slot geometries to determine the most suitable slotted wing configuration.