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AIRFOIL OPTIMIZATION WITH ANALYTICAL SIMULATIONS FOR APPLICATION OF GROUND
EFFECT ON MARS

Abstract

“Mars is there, waiting to be reached.” as told by Buzz Aldrin, Mars as the very next planet to be adroitly explored by mankind, a bounded outstretch over the surface has been achieved with rovers and the ingenuity Mars helicopter in the contemporary times. Air travel as most coherent means, thin Martian atmosphere is a defiance for heavier flight performances. Enacting the ground effect to substructure with least external lift generation factors, a hovering system over the terrain with safe elevation proves effectual. The study proposes the application of ground effect on Mars with optimized airfoil structures to demonstrate ideal purposes, supporting effective long range movements over the terrain. The analysis of the same are performed iteratively over designs modelled on Autodesk Fusion 360, Xflr 5 and OpenVSP to validate theoretical results with computerized simulation techniques opted in COMSOL Multiphysics software. With development of airfoil structures to additively exploit phenomenon of the ground effect, the study lays out an effective and efficient baseline for oncoming research and travels on Mars.