Design and Computational Analysis of a Wing-in-Ground Effect UAV

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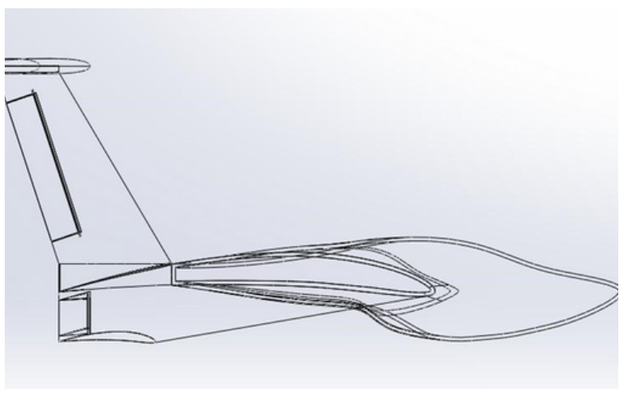
Abstract

Wing-in-Ground (WIG) Effect Unmanned Aerial Vehicles (UAVs) utilize the aerodynamic advantages that arise when an aircraft operates close to a surface, significantly increasing lift and reducing induced drag. This project presents the design, development, and performance assessment of a WIG UAV optimized for low-altitude, energy-efficient flight. This model provides a strong and energy-efficient aerodynamic platform, placed in dynamic low-altitude environments.

METHODOLOGY

Design anameturicel fluid dynamics UAV talleered for ground-effect analysis



CFD SETUP

Use CFD mothodelling with a ground-effect analysis for 1

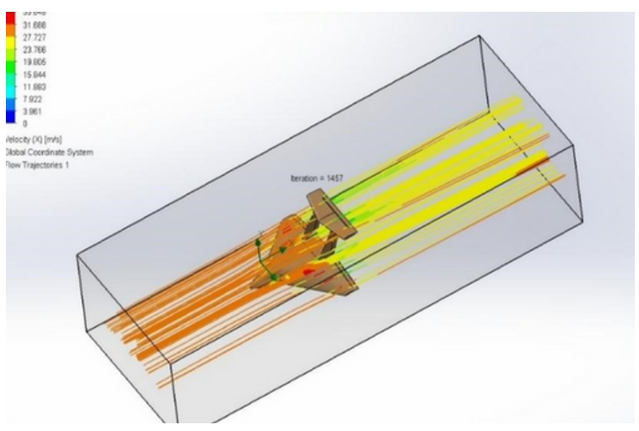
Remaining surfaces

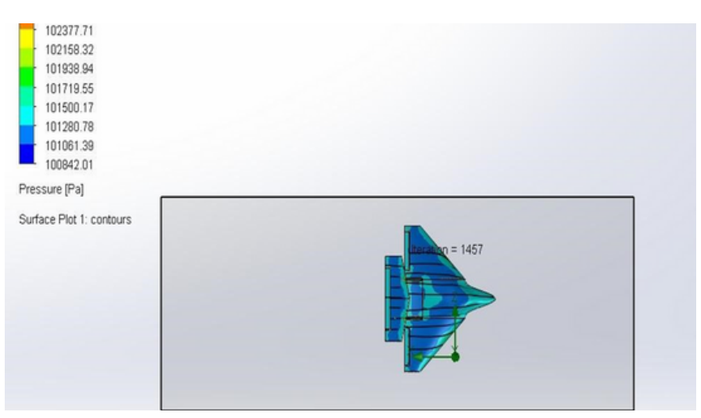
No-stip wells

Inlet at 30m/s

outlet at atmosphere

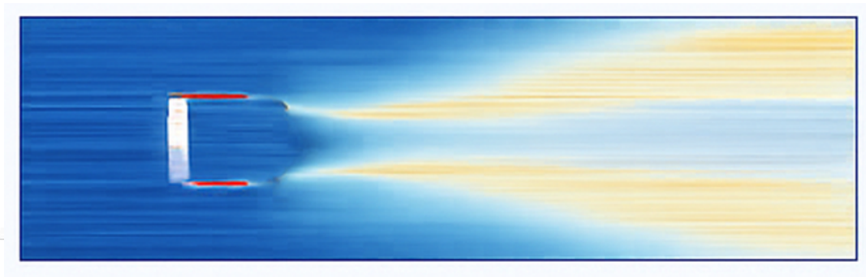
Ground plane





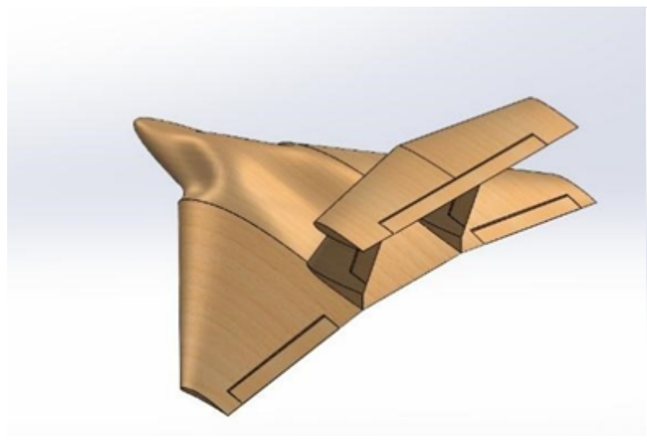
Results.

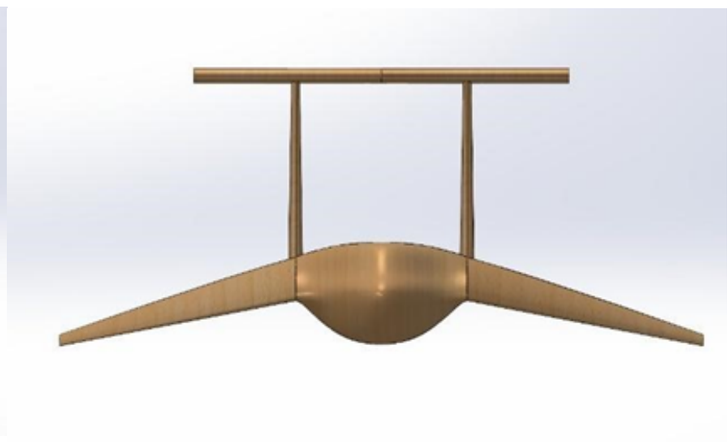
Provided: CFD simulations provclog flow accercelation near the ground n+ above the ground

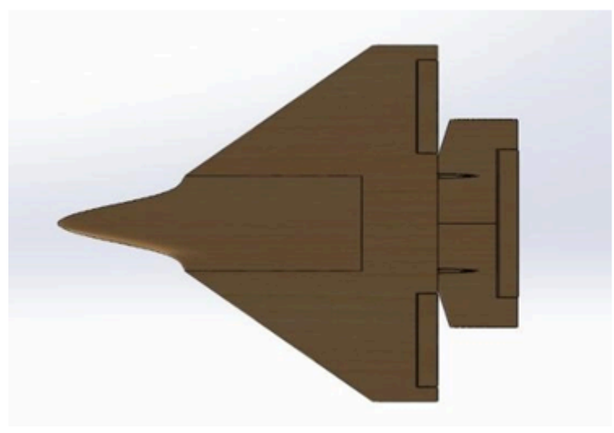


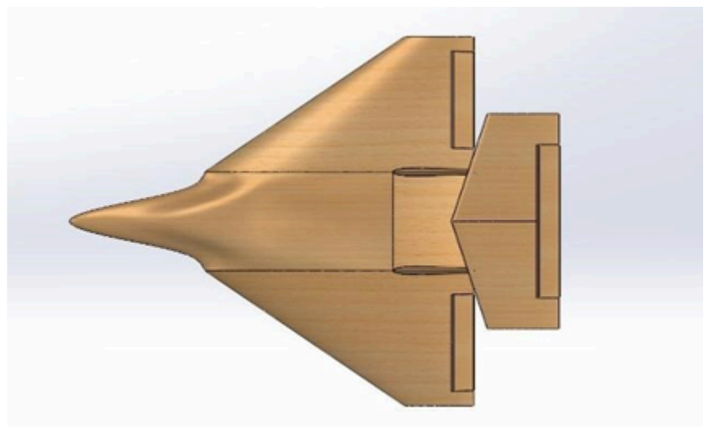
Introduction

Design and CFD modelling of fixed-Mging UAV









Ground-Effect Aerodynamics

- High-pressure region forming into sitbillity and control analysis on high-pressure region.
- Positive lift augmentation in near-ground plane in protes near-ground renidor lifts.
- Develop control strategies for safe safe autonomous operations in SAR mission controls

Future Work

- Use OperOAM solvers for further CFUxation
- Develop stability and control strategies
- Px+ based autonomous navigation near theg ground
- Integrating SAR mission capabilities

CONCLUSION

CFD analysis conducted with optimall wing and flight configurations demonstrate

- Effective grounal effect utilization, an Px4 based solution
- Px4 based autonomous navigation near ground
- Integrating SAR mission capabilities