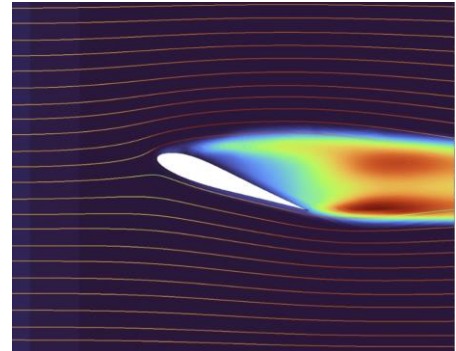
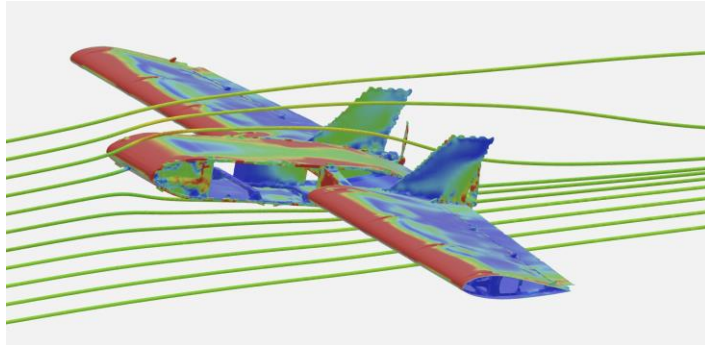


## Aerodynamic Simulation of Lift-Generating Structures in Isaac Lab



This project, developed in close collaboration with the NVIDIA Isaac Lab team, aims to extend the **Isaac Lab simulation framework [1]** with higher-fidelity aerodynamic capabilities by integrating advanced models such as the **Vortex Lattice Method (VLM) [2]**. At present, Isaac Lab lacks native support for realistic aerodynamic force modeling, which limits its applicability for fixed-wing UAV research and broader aerospace simulation tasks.

The proposed work focuses on developing modular plugins and aerodynamic models capable of simulating effects such as wingtip vortices, unsteady drag, and other complex flow phenomena. This will enable higher-fidelity, scalable simulations that integrate seamlessly into the Isaac Lab ecosystem. Beyond basic force coupling, the project will investigate the modeling and identification of intricate aerodynamic behaviors, including wake interactions and boundary-layer effects, that are essential for accurate fixed-wing flight dynamics.

### Tasks:

- Identification and Modelling of Aerodynamic effects
- Comparing to CFD based solutions (Ansys Fluent)
- Integration of aerodynamic models into Isaac Sim/Lab with NVIDIA Warp

### Literature:

[1] Mittal, Mayank, et al. "Isaac lab: A gpu-accelerated simulation framework for multi-modal robot learning." *arXiv preprint arXiv:2511.04831* (2025).

[2] Joseba Murua, Rafael Palacios, J. Michael R. Graham, "Applications of the unsteady vortex-lattice method in aircraft aeroelasticity and flight dynamics"

**Relevant Projects:** Norwegian Centre for Embodied AI, SPEAR, ORIGAMI

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