GPU–VPM
PROJECT PROPOSAL

A GPU-based aerodynamics solver
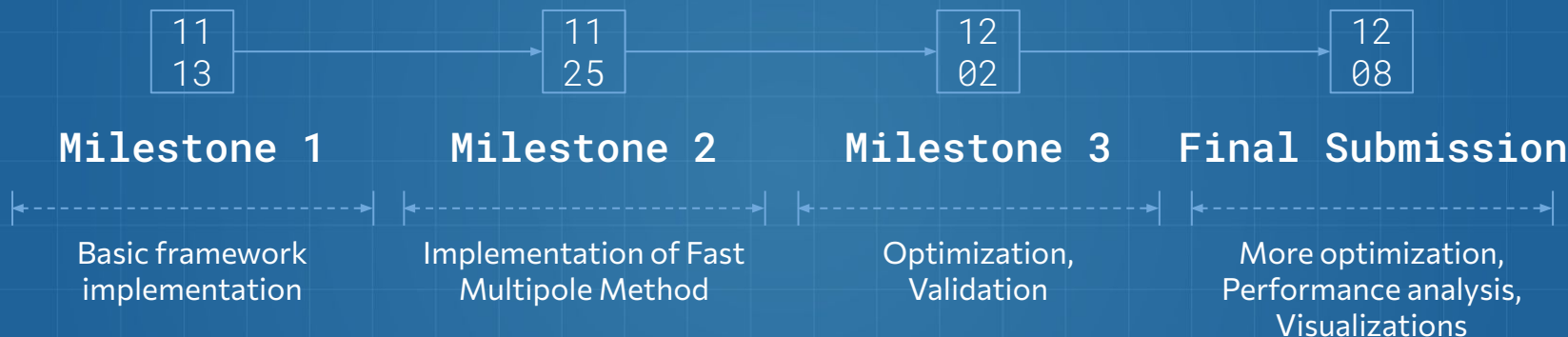
Nadine Adnane | Dominik Kau | Shreyas Singh

ABOUT THE PROJECT

PROJECT TIMELINE

| 11 13 | 11 25 | 12 02 | 12 08 |

Milestone 1   **Milestone 2**   **Milestone 3**   **Final Submission**

Basic framework implementation

Implementation of Fast Multipole Method

Optimization, Validation

More optimization, Performance analysis, Visualizations
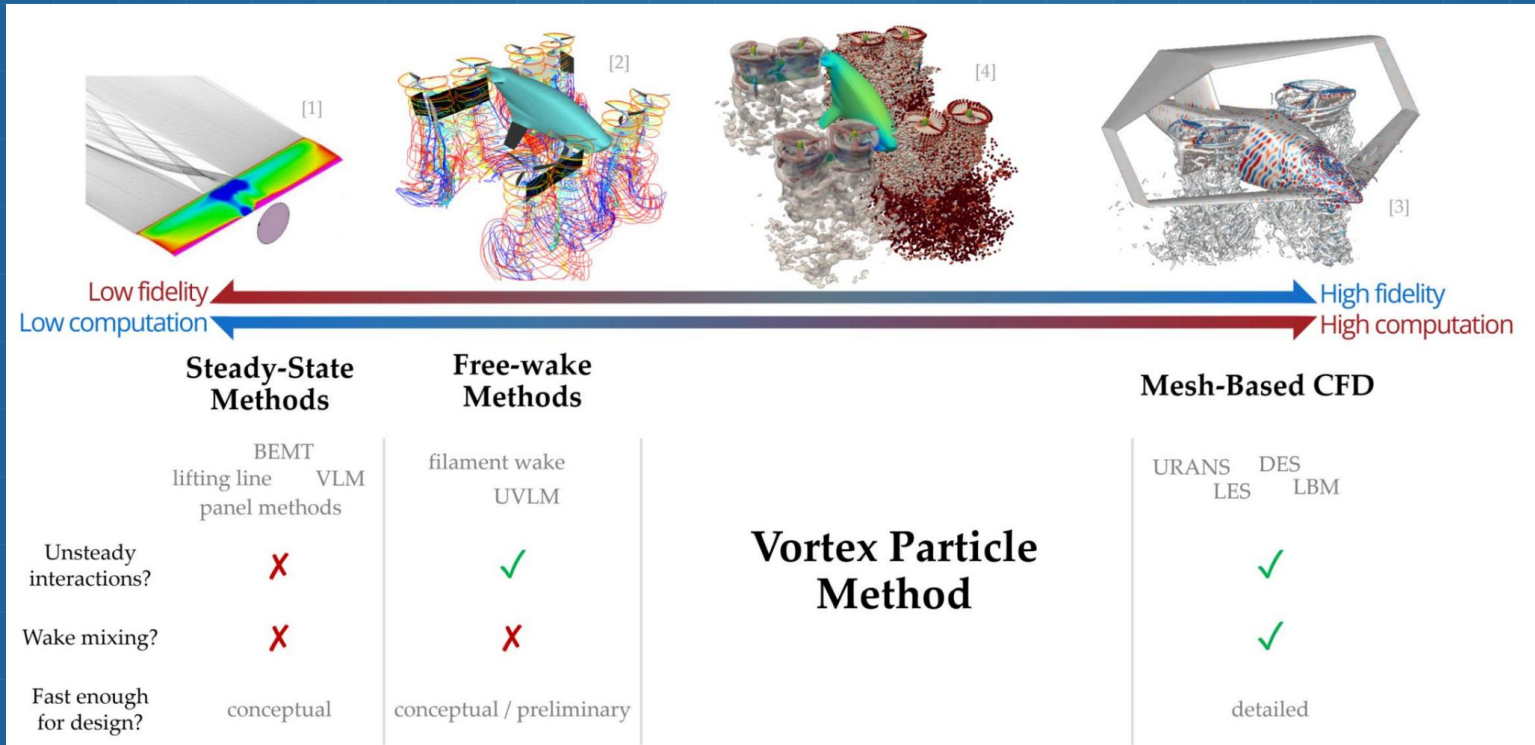
Stable Vortex Particle Method Formulation for Meshless Large-Eddy Simulation (initial paper)
Reformulated Vortex Particle Method and Meshless Large Eddy Simulation of Multirotor Aircraft (PhD Thesis)
FLOWUnsteady (GitHub Repository of CPU implementation)
Treecode and fast multipole method for N-body simulation with CUDA (FMM implementation in CUDA)
Scalable Fast Multipole Accelerated Vortex Methods (VPM on GPU)

GOALS & OUTCOMES

01 Implement reformulated vortex particle method on the GPU!

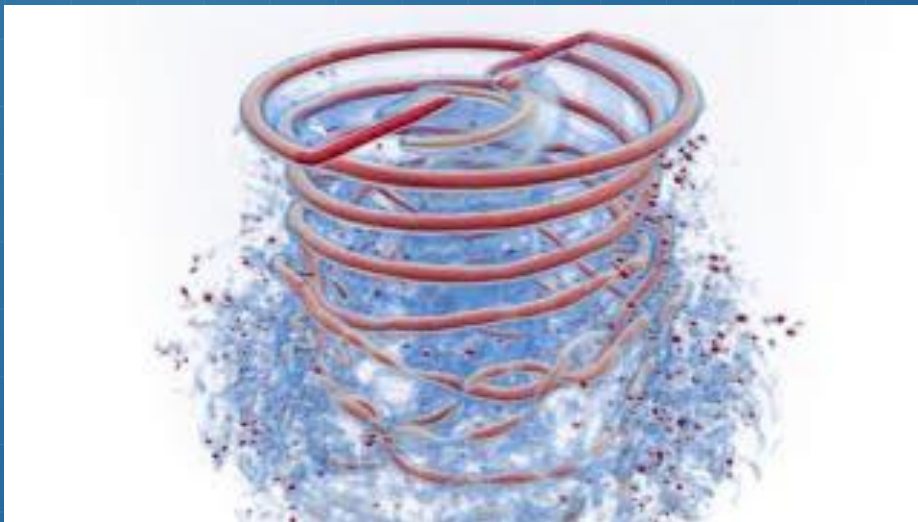**02** Benchmark & validate against the CPU version of the solver

03 Implement a research paper + contact the author! :D

04 **HAVE FUN!!! :D**

Ed Alvarez

WHY DOES THIS MATTER?

1. Medium-fidelity aerodynamic simulation - balances speed and accuracy

2. Enable faster design process in aeronautics industry -> TIME = $$$

3. Open source GPU implementation = More accessible AND efficient!

4. VPM has been implemented on CPU, but seemingly no GPU implementation - yet! ;)

FLOWUnsteady
GitHub

Sponsored by:

THANKS !