

AMSC 663/664 Self Presentation

Dylan Jude
Graduate Research Assistant



University of Maryland
Department of Aerospace Engineering



September 6th, 2016

Background

- ▶ **Grew up in Hawaii**
- ▶ Undergraduate Studies at McGill University (Montreal, Canada)
 - Major: Mechanical Engineering
 - Minor: Software Engineering
- ▶ Briefly worked as a web-developer for a startup company
- ▶ Came to UMD in September, 2014 as a Masters student

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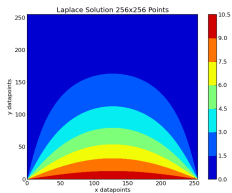
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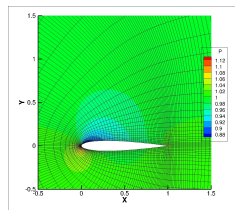
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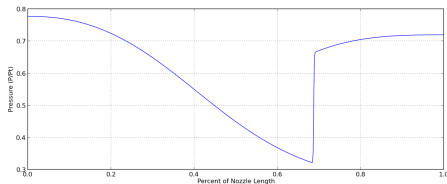
Undergraduate Thesis: GPUs for CFD



Laplace Equation

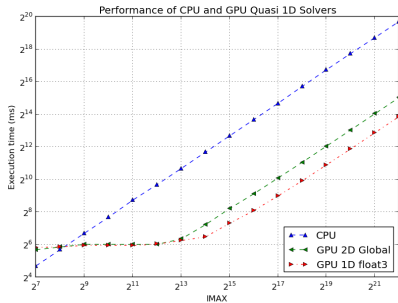
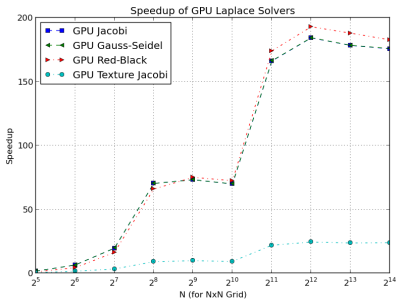
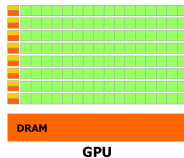
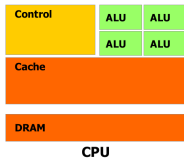


2D Navier-Stokes



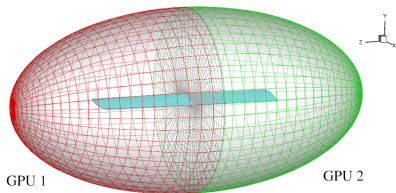
Quasi-1D Euler

GPU Architecture and Performance



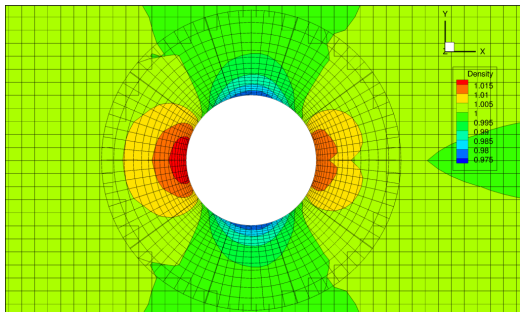
Graduate Research

- ▶ Started with existing single-grid, single-GPU Reynolds Averaged Navier-Stokes code
 - Structured 3D code
 - Line-based implicit with approximate factorization
- ▶ Altered equations for arbitrary grid motion
 - [<pitch_plunge_animation>](#)
- ▶ Multi-GPU capability using MPI



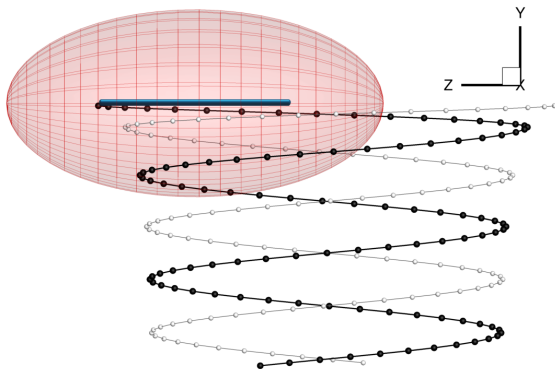
Current Research

Using multiple, overset grids



Current Research

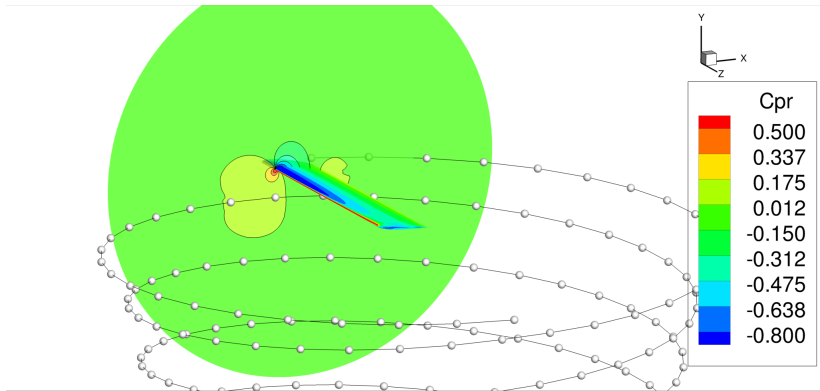
Coupling to a rotorcraft freewake boundary



Current Research

Coupling to a rotorcraft structural analysis code

- ▶ Elastic blade deflections
- ▶ Variable RPM rotor for high-speed, transonic flight



Other Research Interests

- ▶ Implicit methods for the GPU and performance comparisons with the CPU
- ▶ Heterogeneous and asynchronous CPU-GPU computing algorithms
- ▶ Adjoint methods for aerodynamic shape optimization problems

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Questions?