

OVERFLOW 2 Training Class

Introduction

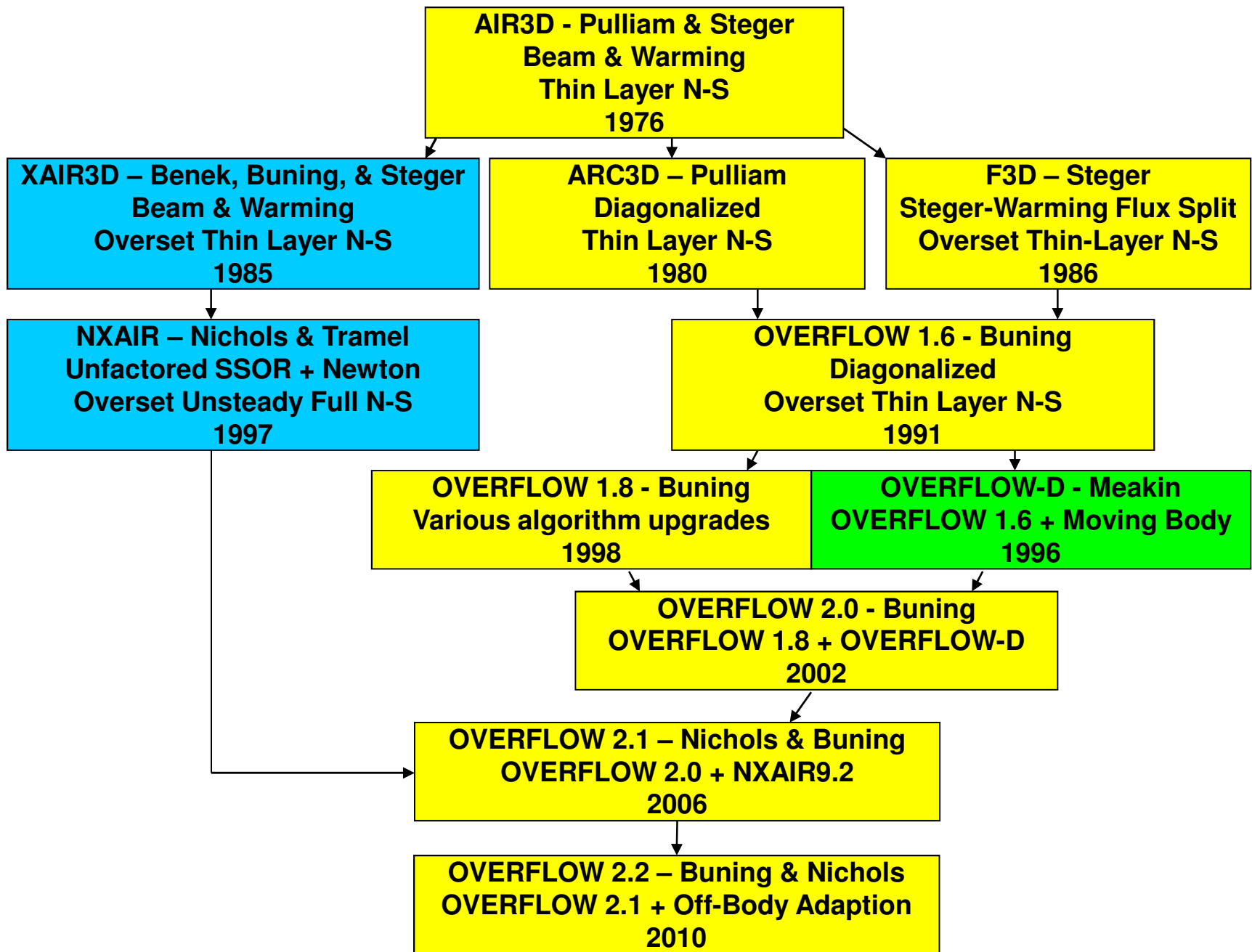
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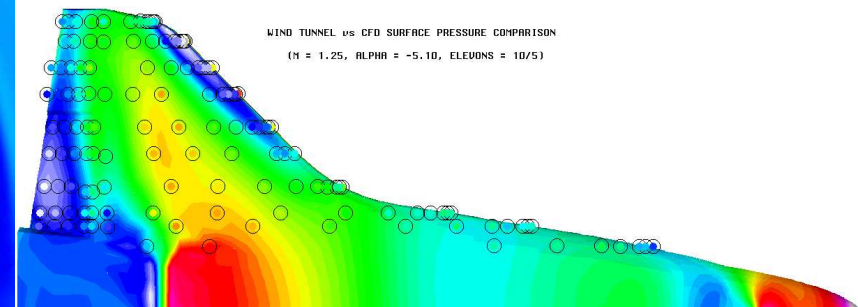
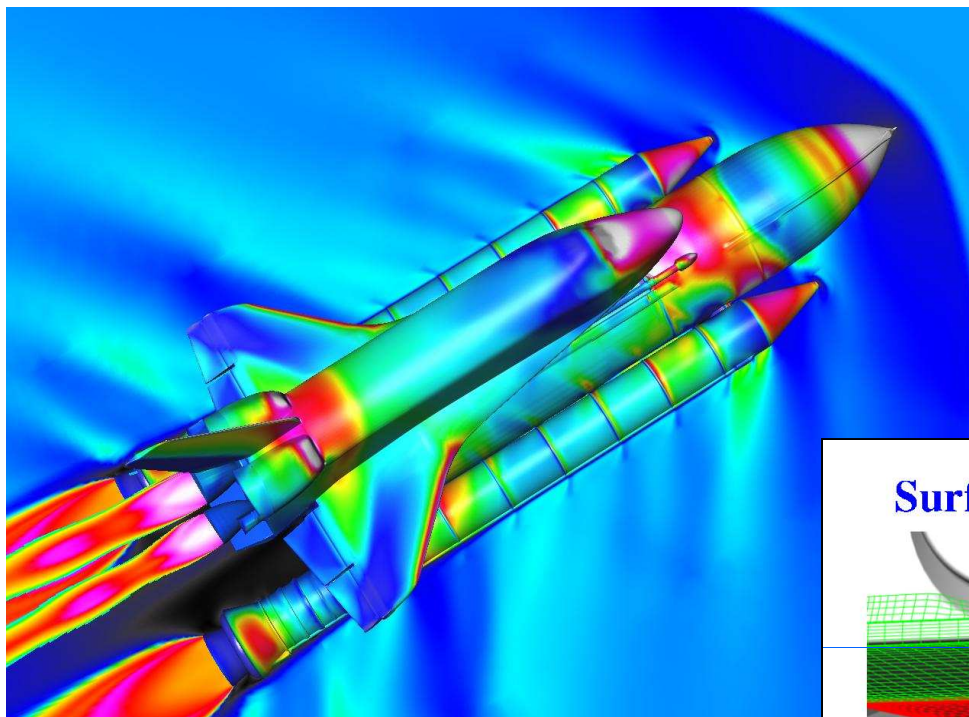
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***10th Symposium on Overset Composite Grids
& Solution Technology***
NASA Ames Research Center
September 20-23, 2010

Origins of OVERFLOW 2

- Major roots
 - F3D (Steger)
 - ARC3D (Pulliam)
 - OVERFLOW-D (Meakin)
 - NXAIR (Nichols)
- Contributors
 - Joe Steger, Tom Pulliam, William Chan, Dennis Jespersen
 - Bob Meakin, Andrew Wissink, Mark Potsdam, Ing-Tsau Chiu
 - Bobby Nichols, Bob Tramel
 - Jeff Slotnick, Steve Krist, Kevin Renze, Shigeru Obayashi, Yehia Rizk
 - and *many* others...
- Major support
 - NASA Basic Research
 - NASA Space Shuttle Program
 - U.S. Army Aeroflightdynamics Division
 - NASA Subsonic Rotary Wing Project
 - NASA Advanced Subsonic Technology Program
 - NASA 2nd Generation Reusable Launch Vehicle Program/Space Launch Initiative
 - DoD High Performance Computing Modernization Program

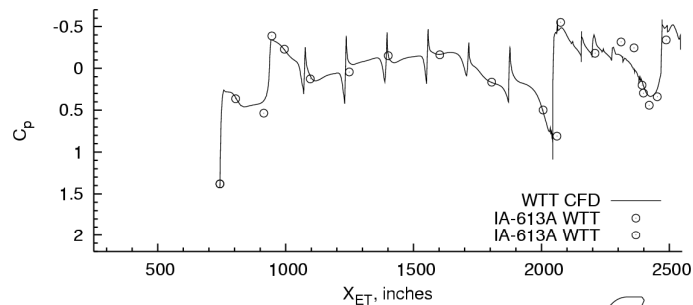




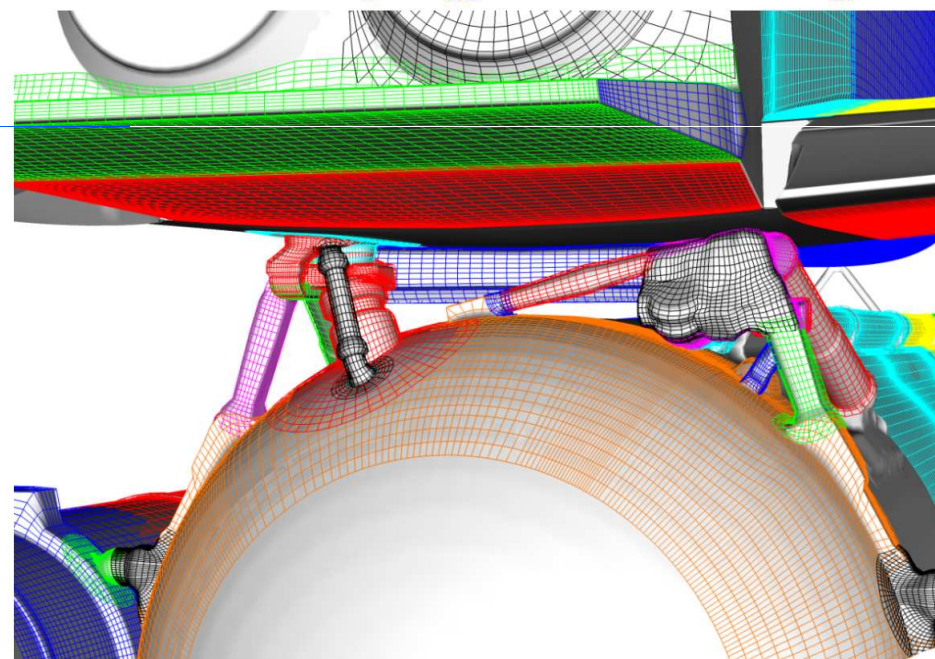
Wind Tunnel Test (IA-613) Comparisons - Left SRB - $\Phi = 180^\circ$

CFD conditions: $M_\infty = 1.25$, $\alpha = -3.95^\circ$, $\beta = 0.00^\circ$, Reynolds $\# = 2.50 \times 10^6/\text{ft}$, IB elevon = 10.00° , OB elevon = 5.00°

WTT conditions: $M_\infty = 1.25$, $\alpha = -3.95^\circ$, $\beta = -0.00^\circ$, Reynolds $\# = 2.50 \times 10^6/\text{ft}$, IB elevon = 10.00° , OB elevon = 5.00°

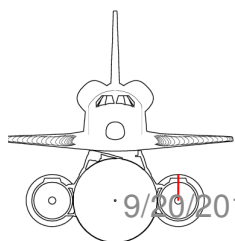


Surface Grid Topology of Aft Attach Region

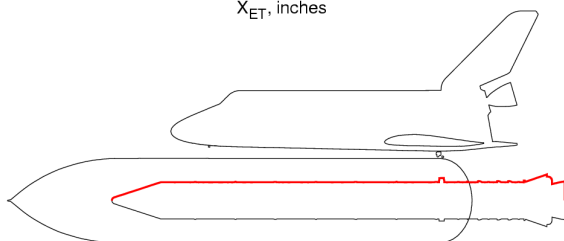


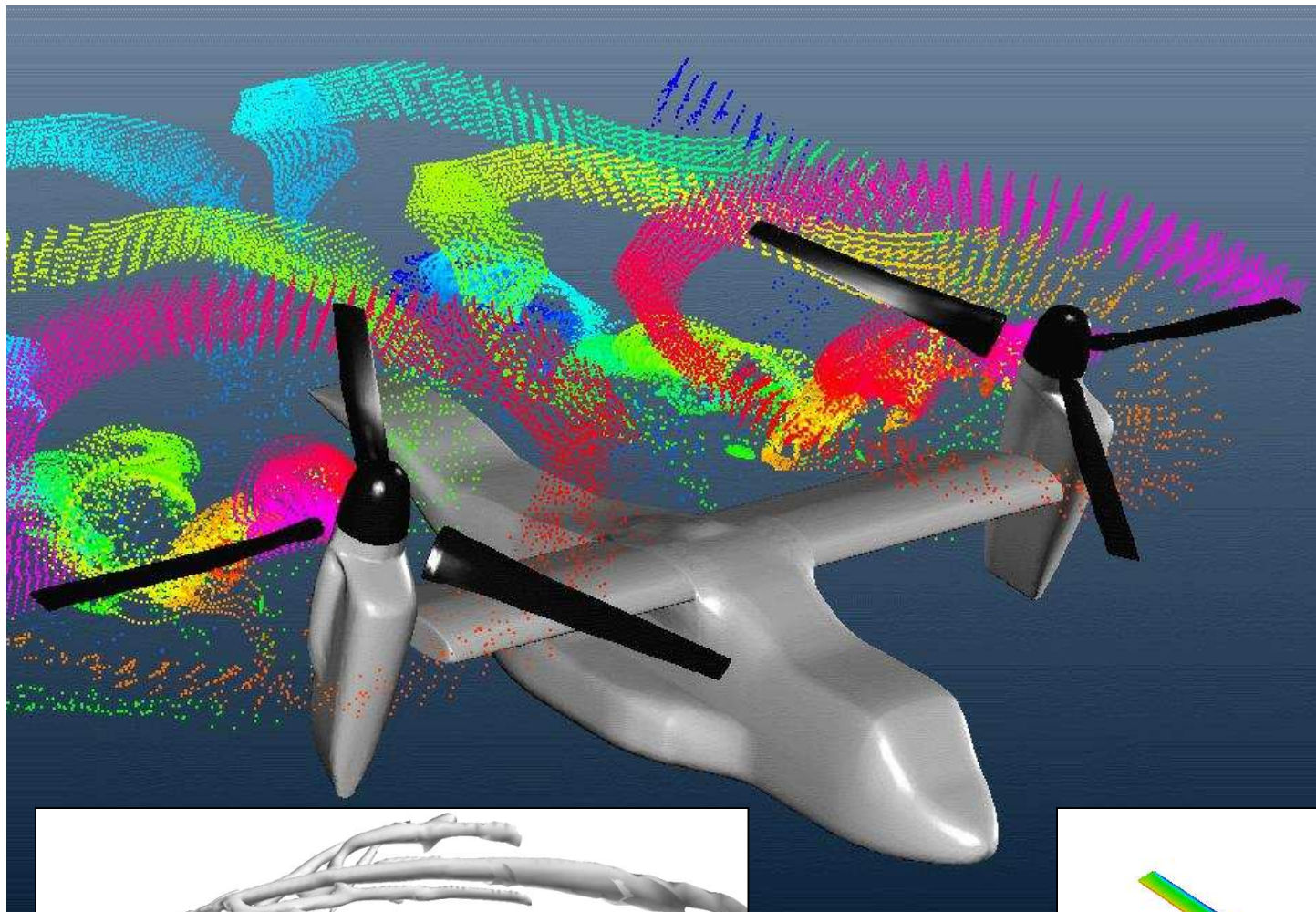
The Grid Guys 1993

AIAA-93-0533

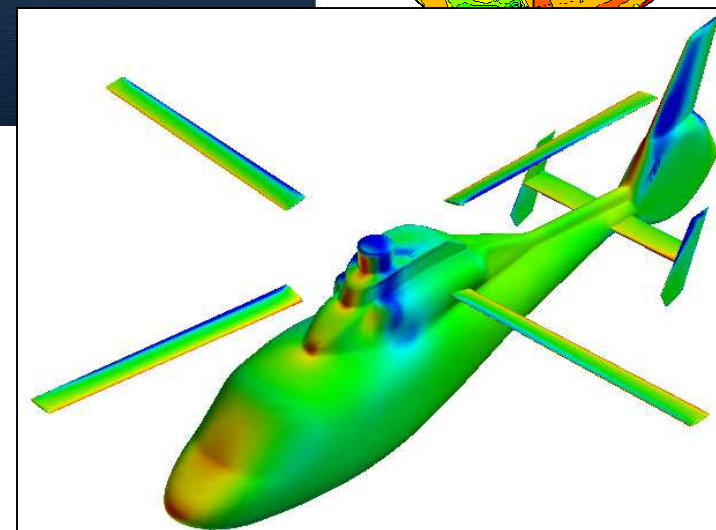
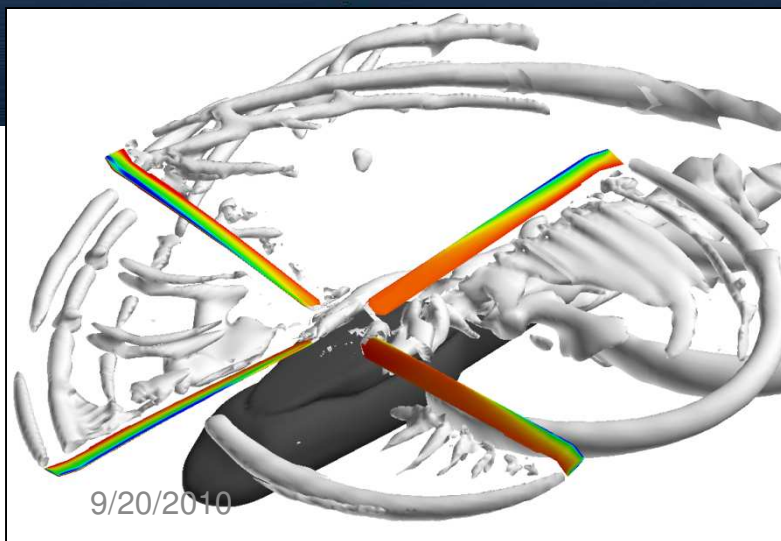
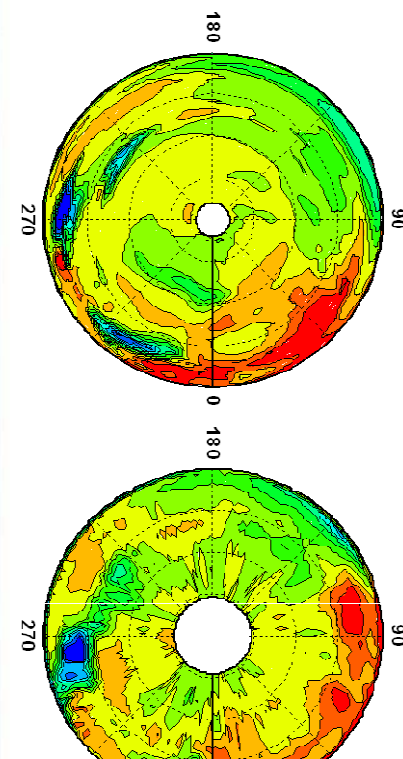


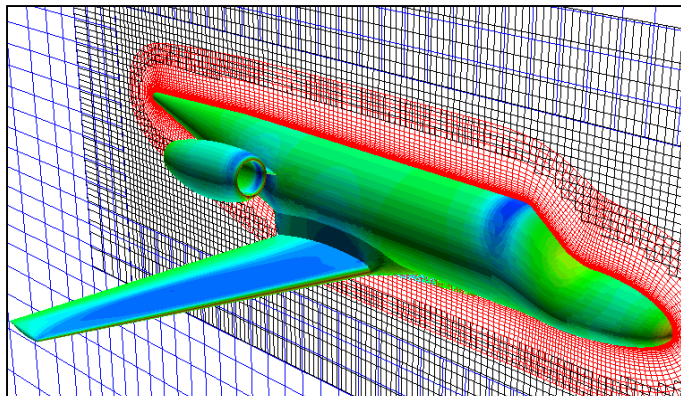
9/20/2010





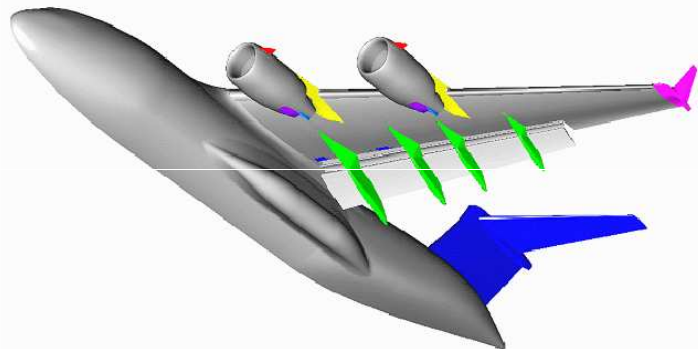
**PITCHING MOMENT
mean removed**





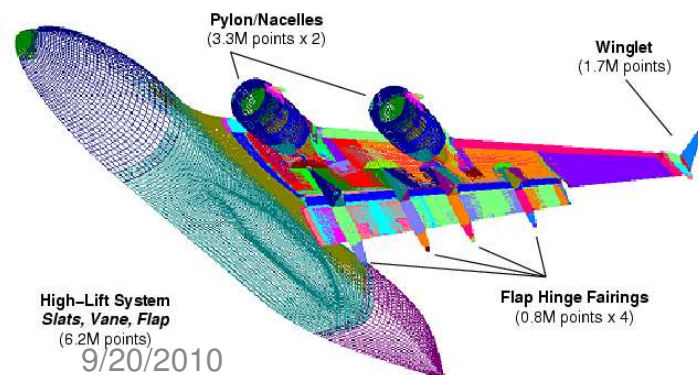
HWT configuration.

Simplified model in gray (16M points).
Complete model includes all components (35M points).

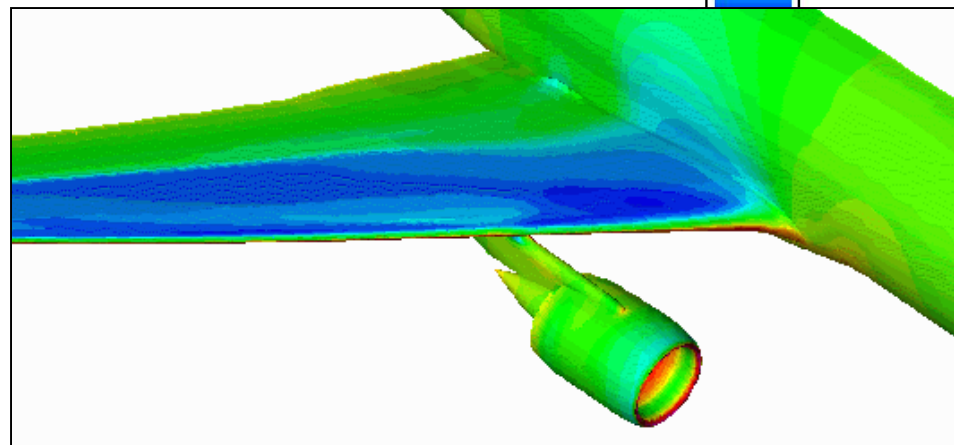
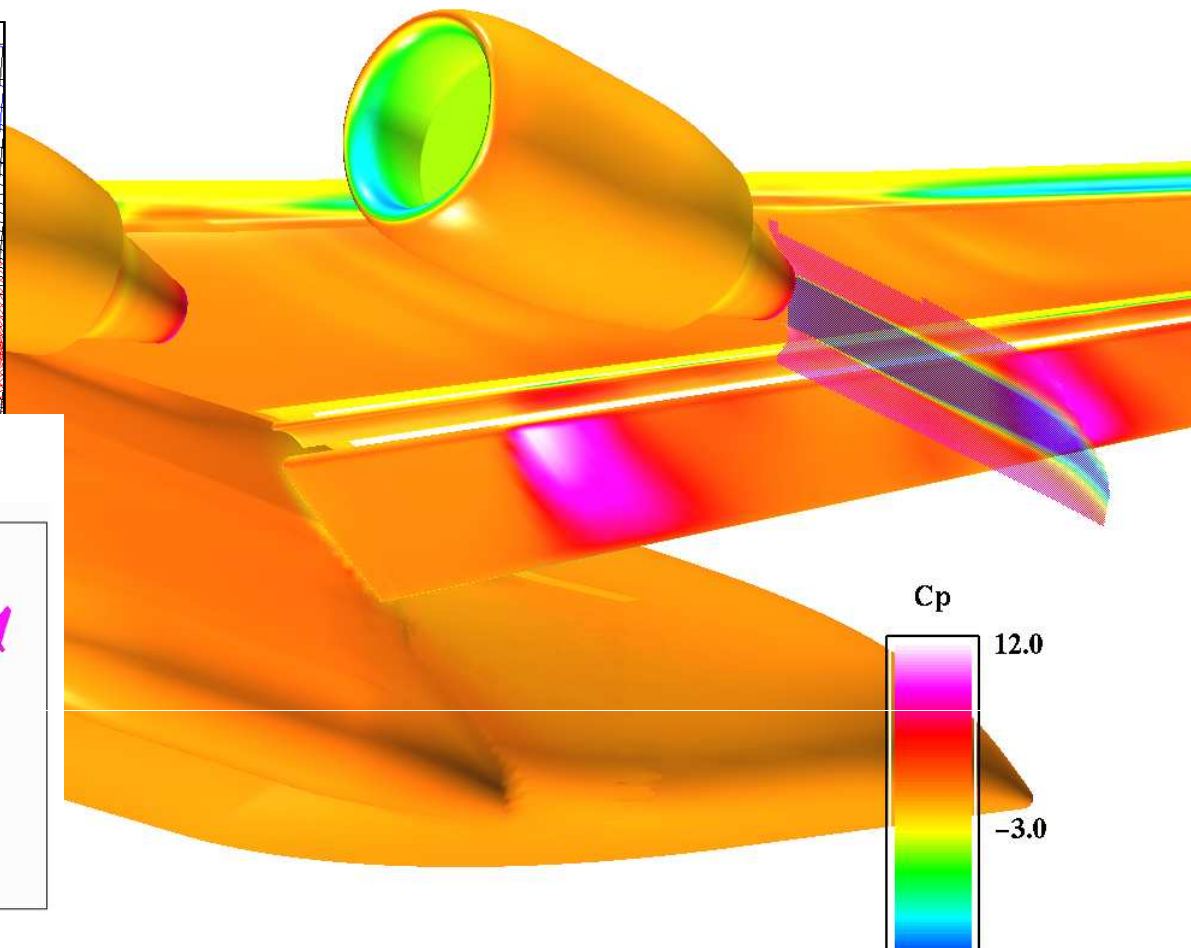


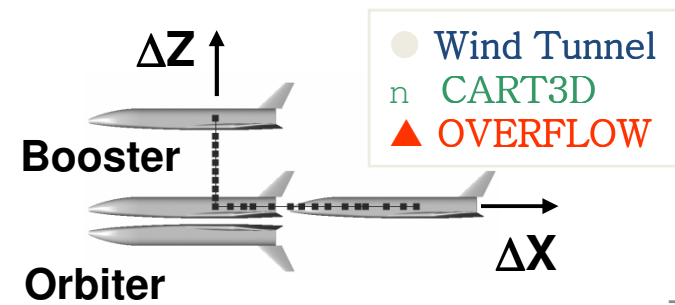
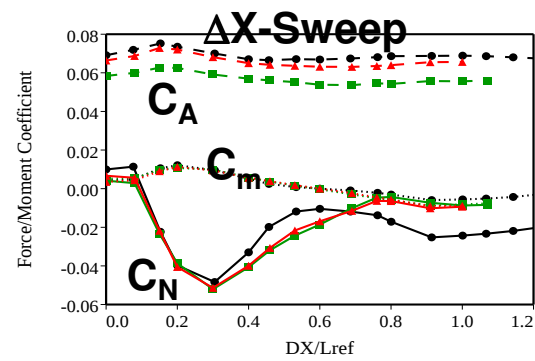
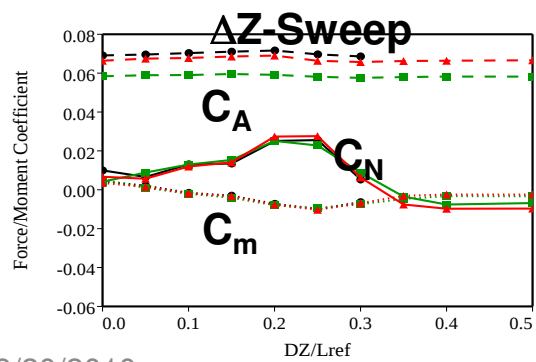
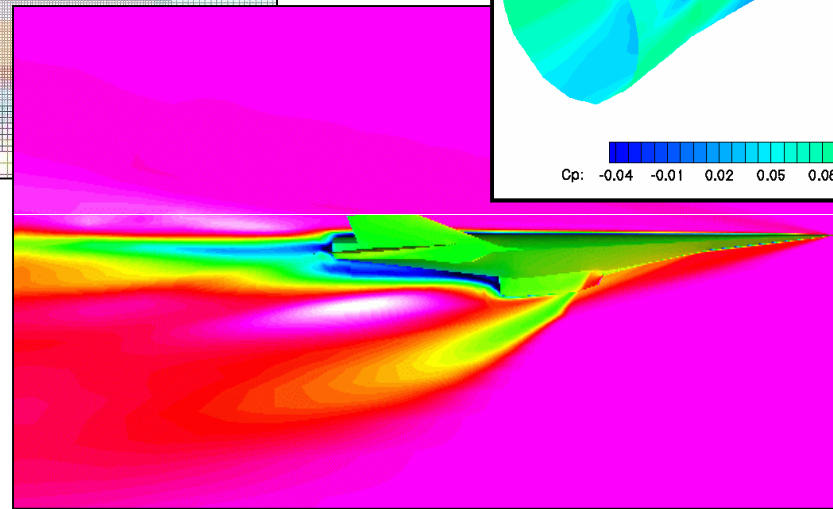
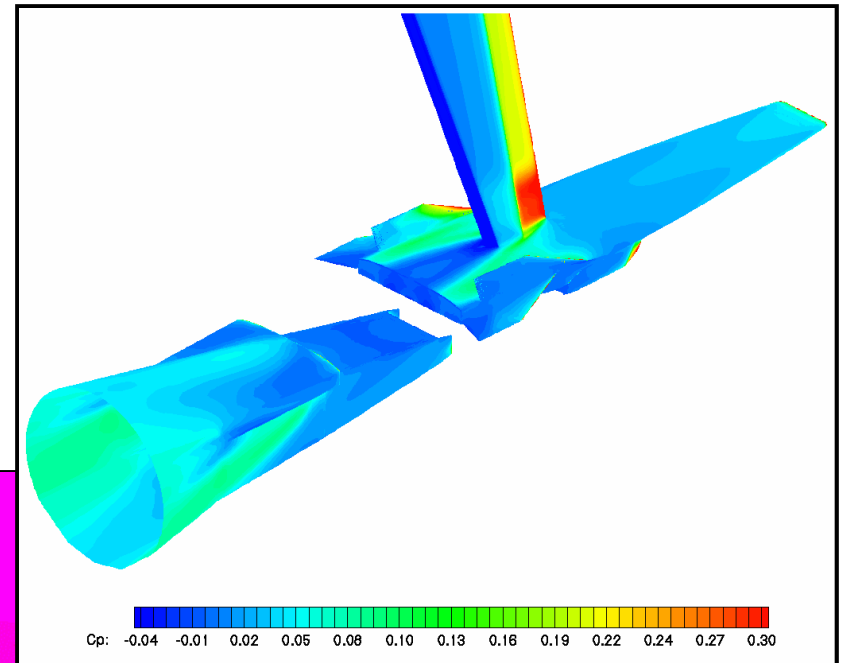
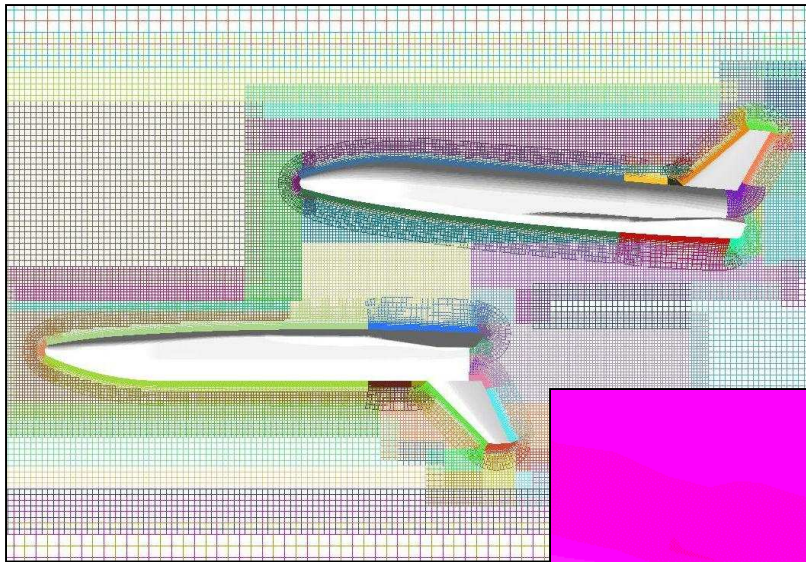
HWT grid system.

Complete model w/o empennage (33.2M points).



9/20/2010





Class Outline

Morning: Bobby Nichols

1. OVERFLOW 2.2 capabilities
2. CFD nomenclature overview
3. Running in OVERFLOW mode
4. NAMELIST Input
 - Inviscid fluxes
 - Implicit solvers
 - Boundary conditions
 - Species equations
 - Turbulence models
 - Unsteady flow outputs

Afternoon: Pieter Buning

1. Introduction/review
2. OVERFLOW-D mode without grid motion
3. OVERFLOW-D mode with grid motion
4. Solution adaption for off-body grids
5. Compiling and running OVERFLOW
6. Utilities and test cases
7. Future directions

Reference Material

- User's Manual for OVERFLOW Version 2.2
 - Code description and theory
 - NAMELIST input description
 - Instructions for 3 modes of code operation
 - File formats
- Turbulence Models and Their Application to Complex Flows
 - Turbulent flow theory
 - Turbulence model theory
 - Recommendations on turbulence model usage