DPW-8 & AePW-4
All-Hands Meeting and Mini Workshop 3

January 15, 2026

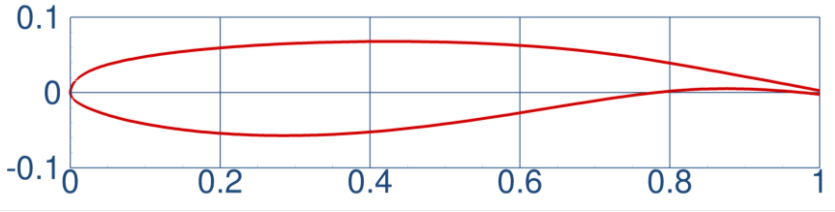
In-Person and Virtual

https://www.aiaa-dpw.org

https://nescacademy.larc.nasa.gov/workshops/AePW4/public

Test Environment Working Group

Test Case 1a: Workshop-Wide Validation



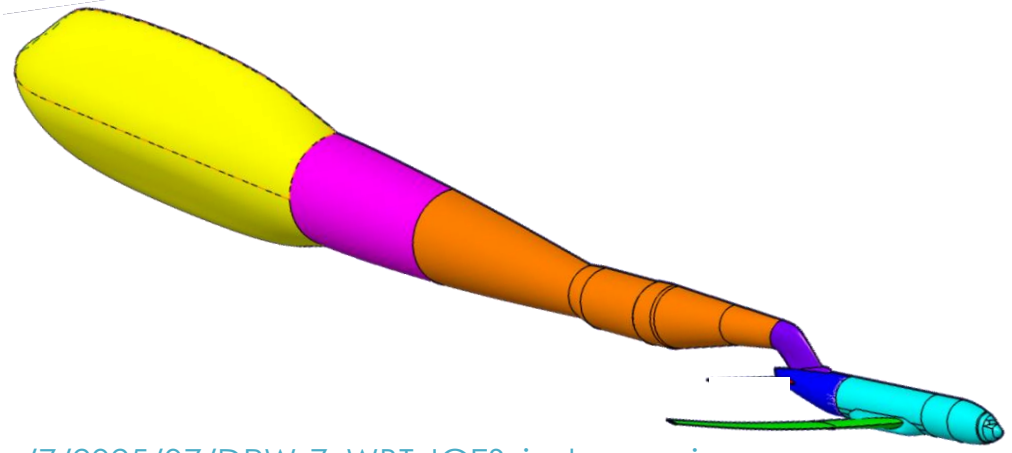
ONERA OAT15A Transonic Airfoil

- **Validation of steady CFD analysis, required**
- **Users are encouraged to employ best practices**
- **Settings**
  - Steady CFD (e.g., RANS)
  - Prefer some version of SA, multiple turbulence models can be submitted
  - Purely 2D simulations (one cell wide)
- **Grids**
  - Six-member RANS grid family; four are required, six are desirable
  - Encourage use of committee-supplied grids; user-generated grids are acceptable
  - Committee-supplied grid is one cell wide with a 230mm chord (same as experiment) and follows RANS best practices
- **Conditions**
  - Mach 0.73, Re_c=3m (based on chord length), T_{static}= 271 K (487.8 R)
  - Alpha: 1.36, 1.50, 2.50, 3.00, 3.10

Jaquin, et al. "Experimental Study of Shock Oscillation over a Transonic Supercritical Profiles." AIAA Journal, Vol. 47, No. 9, 2009. Pages 1985-1994.

Test Case 2a: T&I Study (Wing/Body)

- **CRM Wing/Body with Upper Swept Strut**
  1. Wing/Body (2.7% model scale in tunnel)
  2. Wing/Body + ***Upper Swept Strut***
     - Wing deformed to matching condition (from DPW7)
     - Aft strut surface (shown in yellow) replaces interface to arc sector



- **Geometry**
  - https://commonresearchmodel.larc.nasa.gov/wp-content/uploads/sites/7/2025/07/DPW-7_WBT_IGES_in_low_q.zip
  - https://dpw.larc.nasa.gov/DPW8/Test_Environment/Test_Case_1/Geometry/Sting_No_Arc_Sector_Bulb_noRotation_2025_09_03.igs
- **Conditions & Reference Units**

Mach	Re_c	T_{static} (120° F)	α
0.85	5×10^6	579.67 R | 322.04 K	$-1.50°, 0.00°, 1.50°, 2.50°, 2.75°, 3.00°, 3.25°, 3.50°, 3.75°, 4.00°, 4.25°$

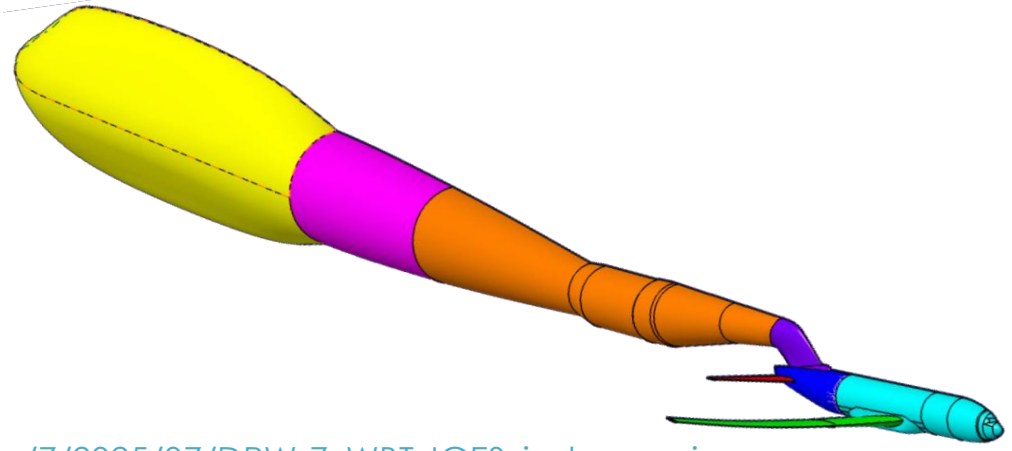
Sref (semi-span grid)	Cref	Semispan	Moment Center
216.77544 sq.in	7.5195 in	31.23225 in	(156.0003, 0.00, -0.00035)

- **Comparison metrics**
  - Forces / Moments
  - Sectional C_P distribution
  - Residuals (Flow & Structural Solver)

Comparison Data
NTF197: r44,r51,r53
NTF215: r43,r103
NTF229: r296,r300,r302
Ames216: r35,r126,r130,r133

Test Case 2b: T&I Study (Wing/Body/Tail)

- **CRM Wing/Body with Upper Swept Strut**
  1. Wing/Body/Horizontal Tail (2.7% model scale in tunnel)
  2. Wing/Body/Horizontal Tail + ***Upper Swept Strut***
     - Wing deformed to matching condition (from DPW7)
     - Aft strut surface (shown in yellow) replaces interface to arc sector



- **Geometry**
  - https://commonresearchmodel.larc.nasa.gov/wp-content/uploads/sites/7/2025/07/DPW-7_WBT_IGES_in_low_q.zip
  - https://dpw.larc.nasa.gov/DPW8/Test_Environment/Test_Case_1/Geometry/Sting_No_Arc_Sector_Bulb_noRotation_2025_09_03.igs
- **Conditions & Reference Units**

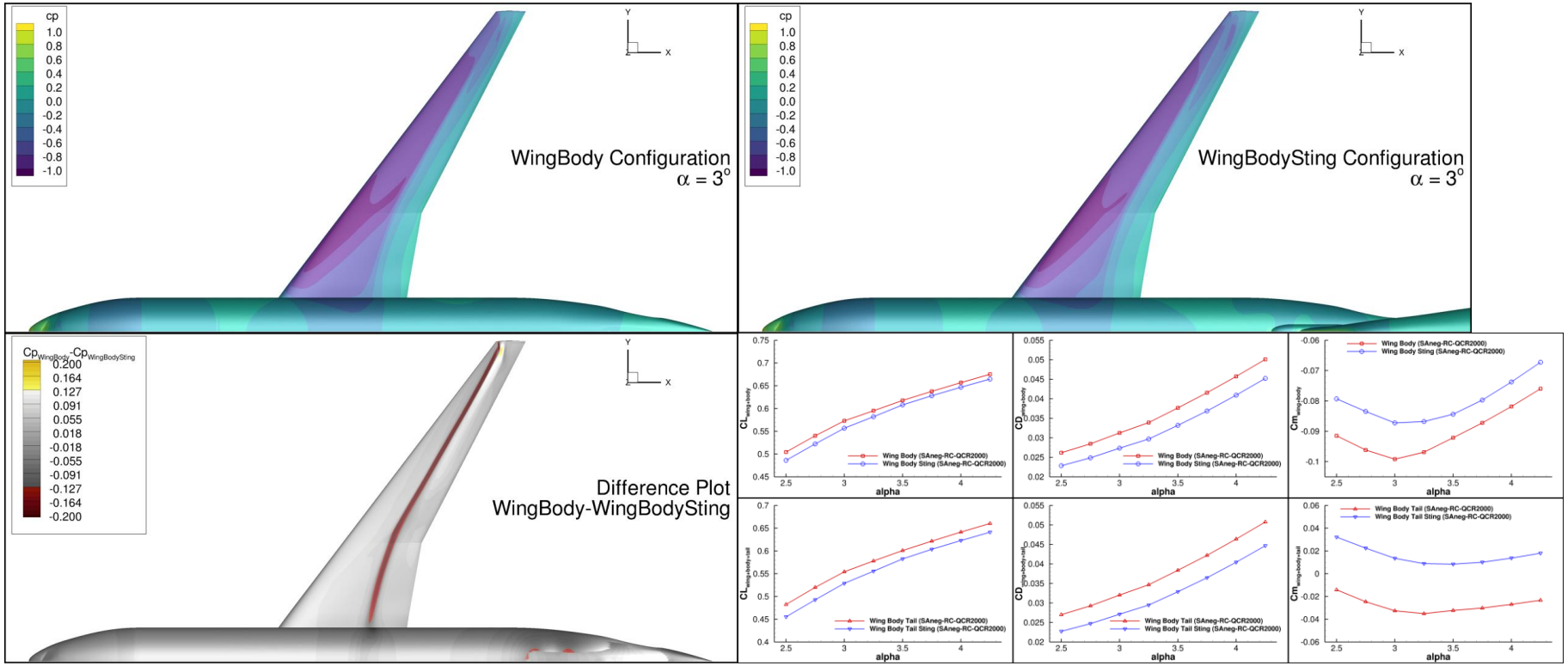
Mach	Re_c	T_{static} (120° F)	α
0.85	5×10^6	579.67 R | 322.04 K	$-1.50°, 0.00°, 1.50°, 2.50°, 2.75°, 3.00°, 3.25°, 3.50°, 3.75°, 4.00°, 4.25°$

Sref (semi-span grid)	Cref	Semispan	Moment Center
216.77544 sq.in	7.5195 in	31.23225 in	(156.0003, 0.00, -0.00035)

- **Comparison metrics**
  - Forces / Moments
  - Sectional C_P distribution
  - Residuals (Flow & Structural Solver)

Comparison Data
NTF197: r92,r97,r99
NTF215:
NTF229:
Ames216:

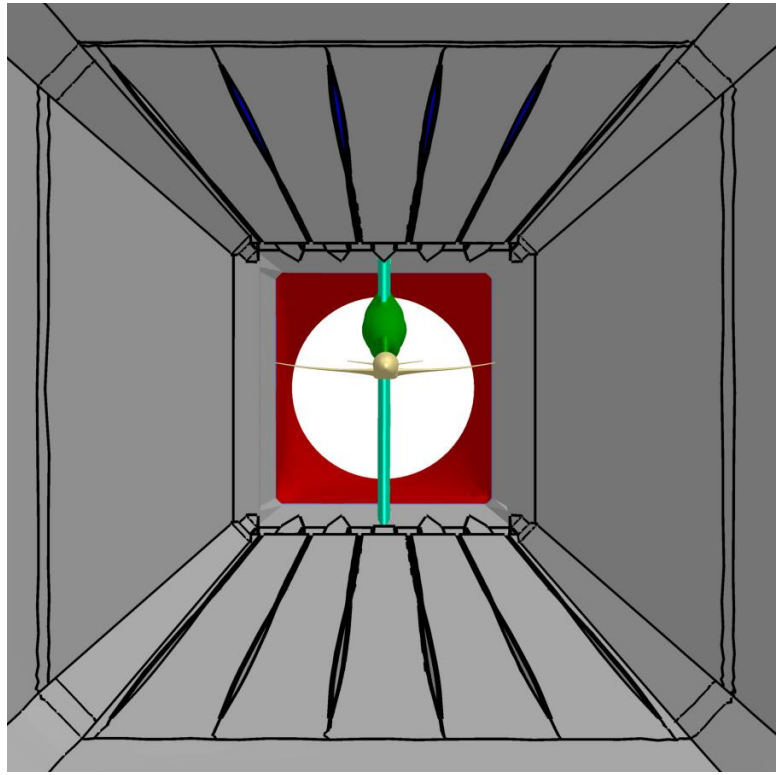
Test Case 2a: Preliminary Findings



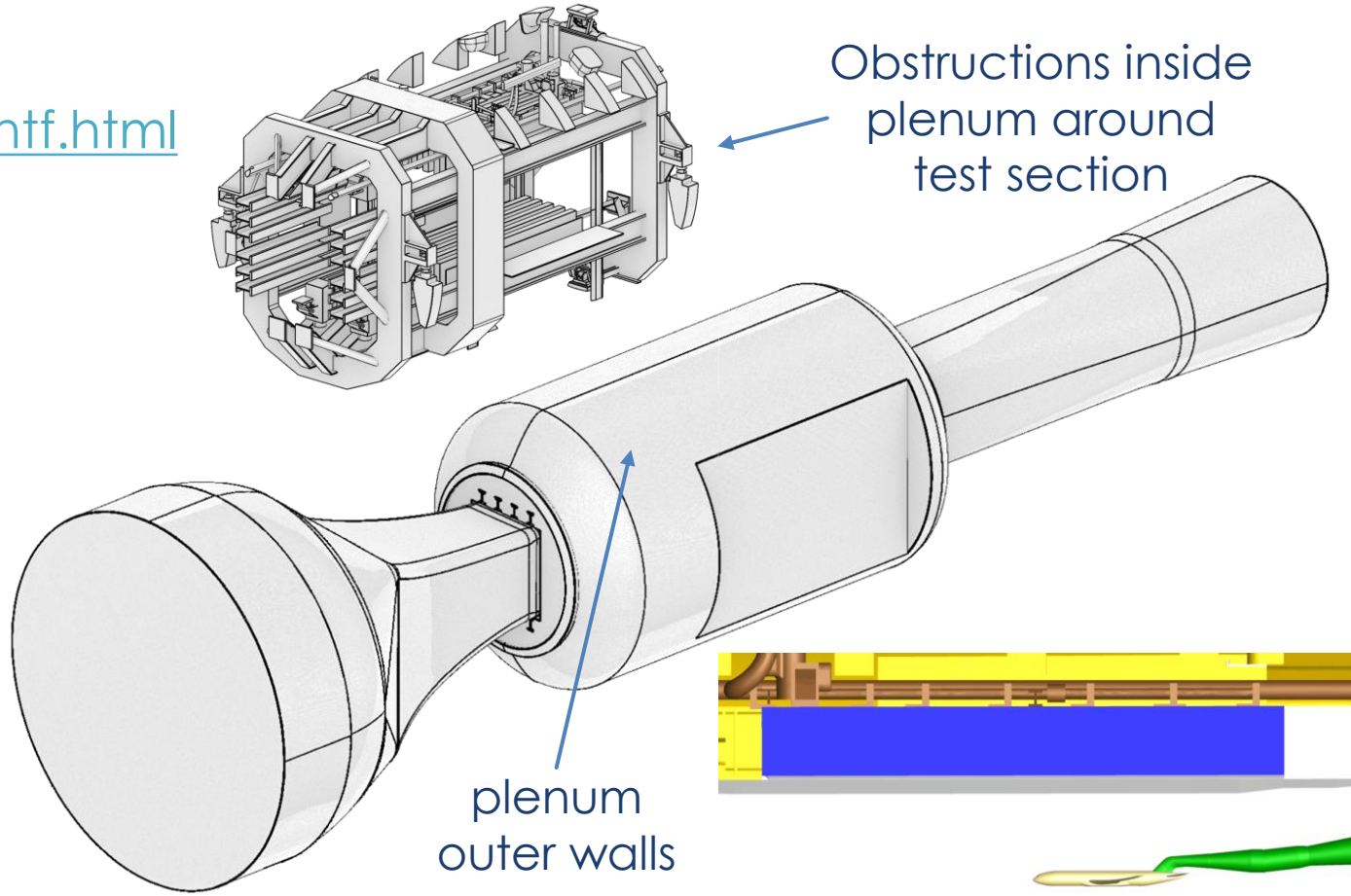
- **Preliminary steady-state RANS analysis has been performed using SAneg-RC-QCR2000**
- **Inclusion of the sting moves the wing shock forward reducing the lift and drag as well as the static stability of the aircraft**
- **Contour plots at 3-degrees AOA show the shock movement and integrated loads demonstrate the shift caused by the sting**

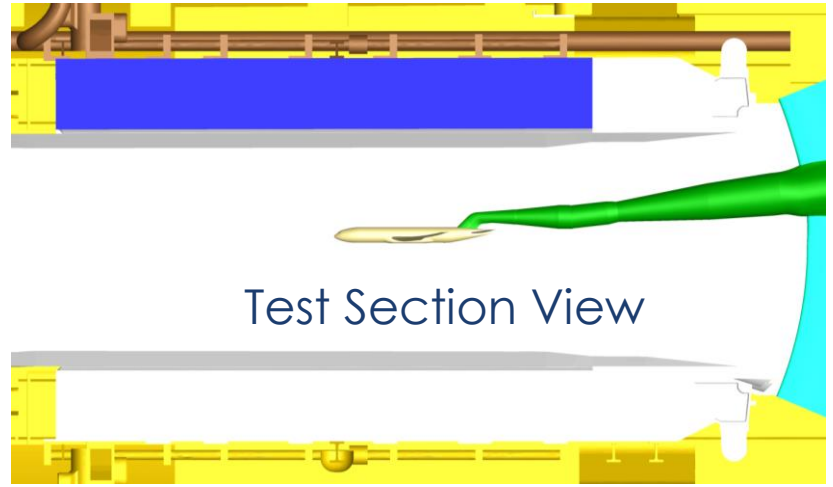
NTF Geometry Available

- **NTF Geometry is available:**
  - https://www.aiaa-dpw.org/ntf.html



Test Section View





Test Section View

Wind Tunnel Test Environment WG: Key Questions

- How much of the spread between experimental and computational results is due to the test environment?
- What methods are needed to quantify the effect of the mounting hardware on force/moment and pressure measurements?
- Can state-of-the-art methods accurately simulate the full NTF test section, including slots and gaps?