

Static Deformation Working Group

Test Case 1



Version 3
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- **Geometry is available here: (it is very strongly desired to use the provided IGES file in the ONERA OAT15A zip file and not the raw coordinates)**

<https://aiaa-dpw.larc.nasa.gov/geometry.html>

- **Committee-supplied RANS grids are available here**

<https://aiaa-dpw.larc.nasa.gov/grids.html>

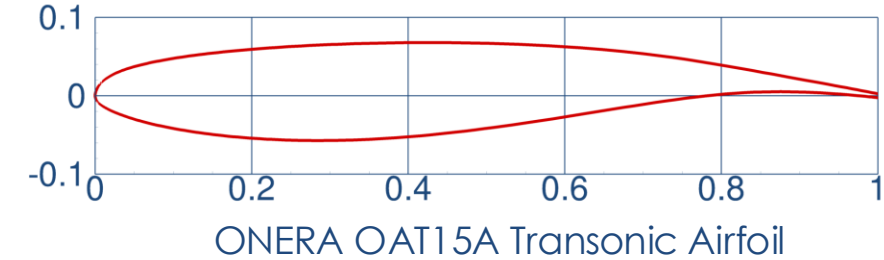
- **Experimental data are available here**

<https://aiaa-dpw.larc.nasa.gov/experiment.html>

Test Case 1a: Workshop-Wide Validation

- **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
 - Use periodic boundary conditions for sidewall boundary conditions
- **Grids**
 - Six-member grid family; four are required, six are desirable
 - Encourage use of committee-supplied grids; user-generated grids are acceptable
 - Three committee-supplied once-cell-wide grid topologies are provided
- **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
 - Experimental conditions (for reference): $P_{total}=102.4$ kPa; $P_{static}=71.8$ kPa

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 1a: Data Submission

- **Please follow these instructions**

<https://aiaa-dpw.larc.nasa.gov/postprocessing.html>

- **Required data**

- Forces and Moments

- DPW8-AePW4_ForceMoment_v5.dat

- Surface cuts

- DPW8-AePW4_SectionalCuts_v5.dat

- Use sectionalCutter-v2.mcr

- Convergence data

- DPW8-AePW4_Convergence_v5.dat

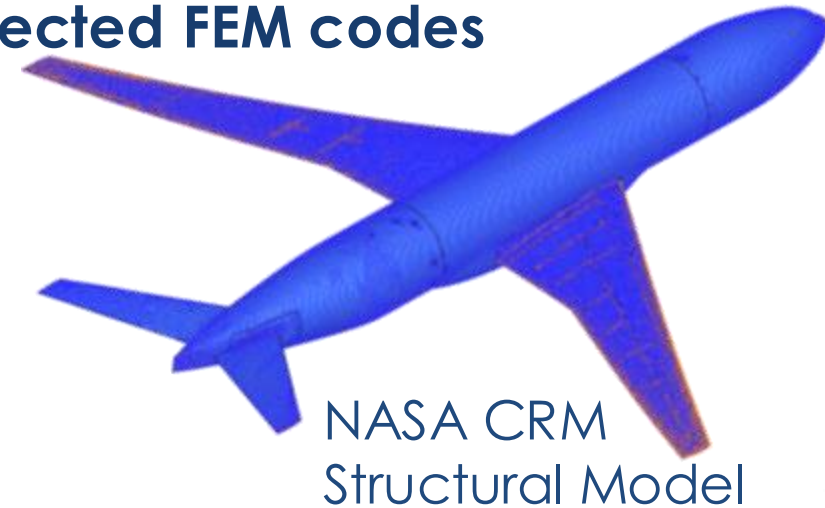
- Contour plots

- Use airfoilImages-v2.mcr

Test Case 1b: NASA CRM Geometry & FEM

- These files are in work
- More will be posted in the future

- **Validation of Structural Model for NASA CRM**
 - Tap Test planned for comparison to normal mode solutions of FEM models
 - Static Loads Tests will be conducted to compare deflection measurements (and maybe twist) to Linear Static FEM solutions
- **Users are encouraged to employ best practices for selected FEM codes**
- **Settings**
 - Linear Eigenvalue Analysis (e.g. NASTRAN® SOL103)
- **Conditions**
 - Rigid suspension at sting
- **Grid**
 - MSC NASTRAN® solid 4-node tetrahedral finite-element structural model
 - Model consists of $6.8 \cdot 10^6$ elements, $4.1 \cdot 10^6$ degrees-of-freedom
 - Supplied by NASA Langley's Configuration Aerodynamics Branch
 - Wind tunnel sting will be added as beam model (date ???)



Test Case 1b: Data Submission (In Work)

- Please follow these instructions

<https://aiaa-dpw.larc.nasa.gov/postprocessing.html>

- More information coming



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