DPW-6 Summary of Participant Data
Test Case 5
CRM WB Coupled Aero-Structural Simulation

Stefan Keye

Dimitri Mavriplis

**Institute for
Aerodynamics and Flow Technology
German Aerospace Center
Braunschweig, Germany**

**Department of Mechanical Engineering
University of Wyoming
Laramie, WY**

Wissen für Morgen

DLR

www.DLR.de

6th AIAA CFD Drag Prediction Workshop, 16 -17 June 2016, Washington, D.C.
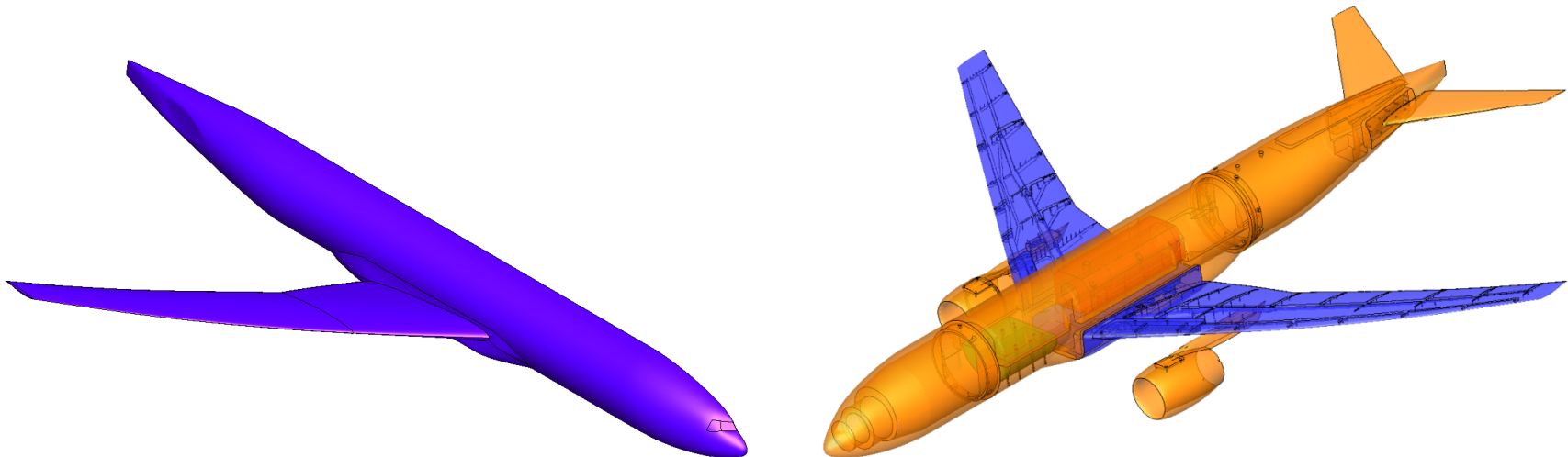
Contents

- **Overview Test Case 5**

- **Results**

- **Conclusions**

Overview Test Case 5

- **CRM Wing-Body Coupled Aero-Structural Simulation [Optional].**

- **Flow Conditions: $Ma_\infty = 0.85$; $Re = 5.0 \times 10^6$; fixed $C_L = 0.5+/-0.0001$; $T_{ref.} = 100F$.**

- **Medium Baseline Grid.**

- **Finite-Element Model supplied by NASA via CRM Website.**

- **Compute static aero-elastic Deflections, starting from the undeformed Geometry.**

Overview Test Case 5
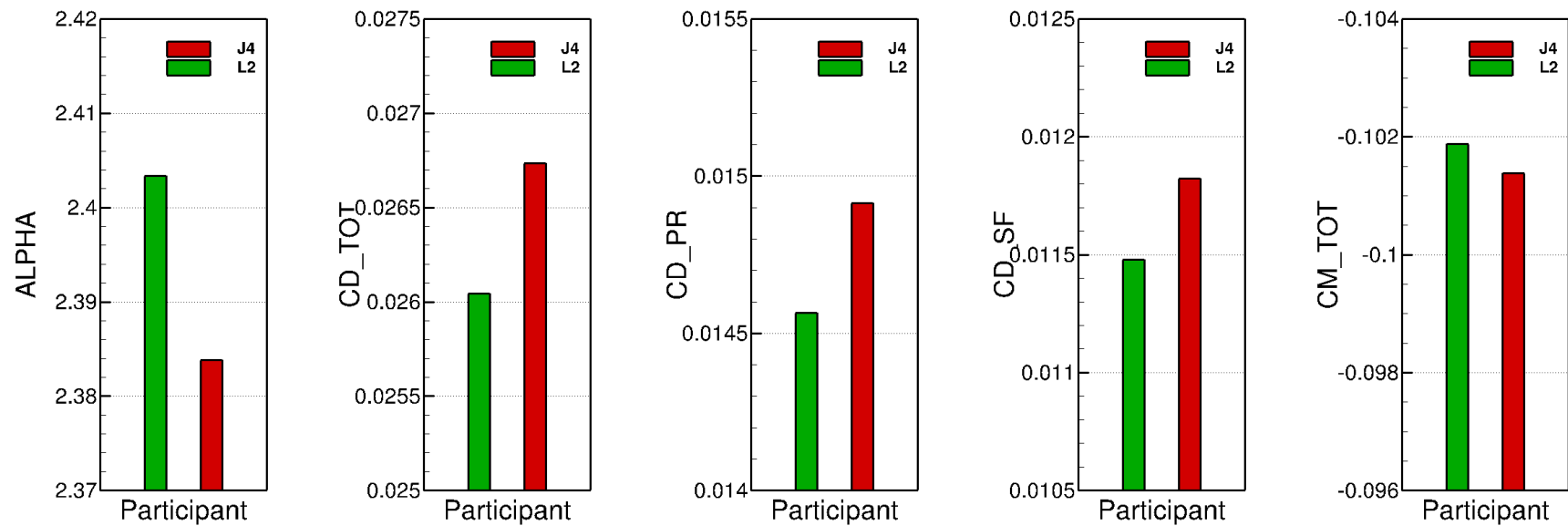
- **Data submitted by 3 Teams.**

- **Flow (CFD) Solvers:**   • **Finite-Volume (3)**

- **Structural (CSM) Solvers:**   • **linear static Analysis (2)**
                                                 • **linear modal Analysis (1)**

- **Interpolation Methods CFD⇨CSM:**   • **nearest-Neighbor (3)**

- **Mesh Deformation Algorithms:**   • **Radial Basis Functions (2)**
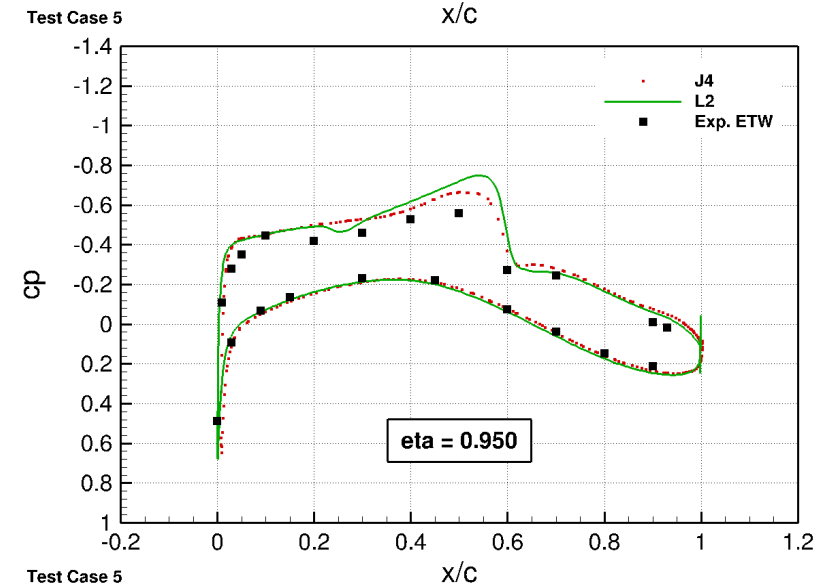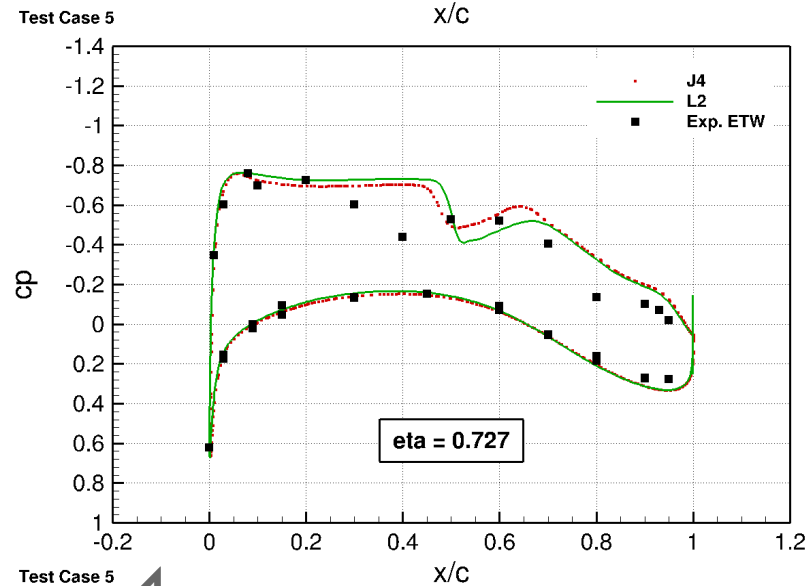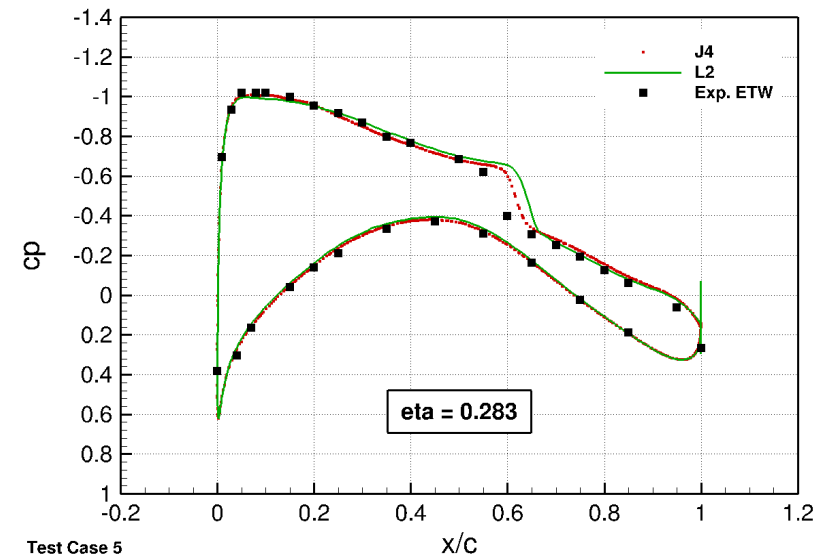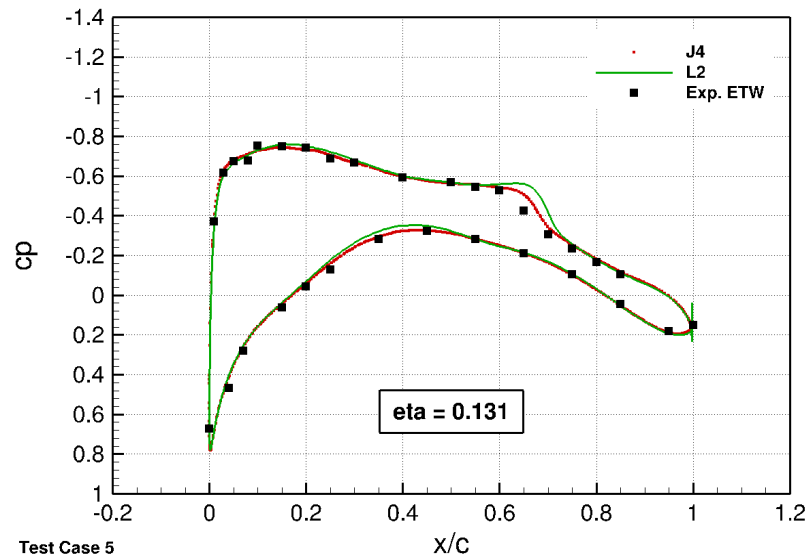   • **Torsional Spring Analogy (1)**

DLR

Results
- Force & Moment Data -

Participant	Grid Size	C_L
J4	47.7mio.	0.500016
L2	26.8mio.	0.500010

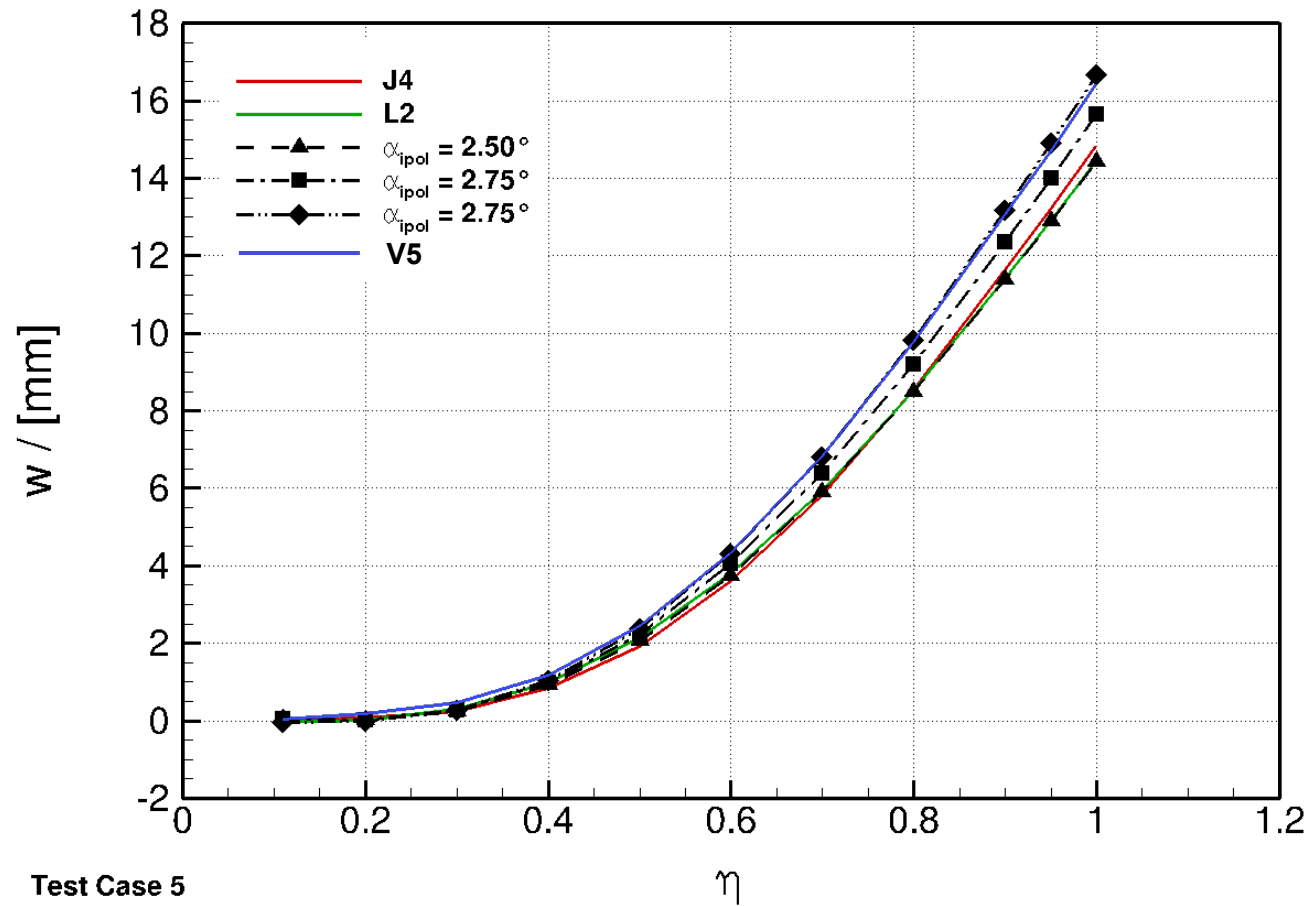# Results   - Wing static Pressure Distributions -

Results
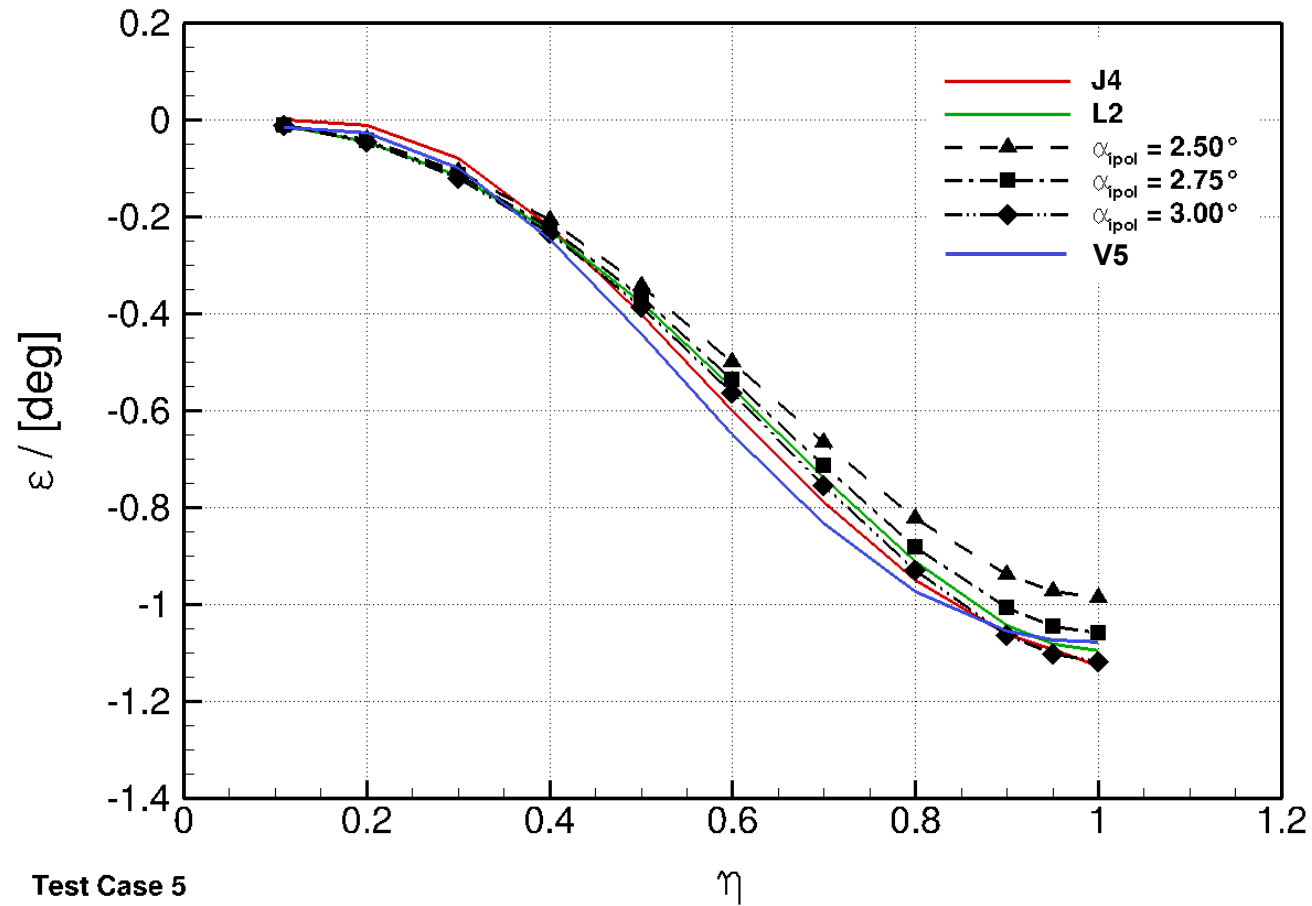## - Wing Deformations -

Test Case 5

Results
- Wing Deformations -

Test Case 5

DLR

Conclusions

- **Generally good Agreement between Teams.**

- **Minor Deviations for chord-wise Shock Location.**

- **Some Discrepancies for Slope of Twist Curve near Wing Root and Tip.**

- **Not enough Data for Statistics.**