



# **5<sup>th</sup> High Lift Prediction Workshop**

**August 2-3, 2024**

# **Group Discussion**

**HLPW Leadership Team**

# Topics

- Post-workshop next steps
- HLPW-6
- How to maintain momentum?
- What role should RANS CFD play in future workshops?
- What experimental datasets are crucial for future workshops?
- Acknowledgments
- Announcements

# Post-Workshop Next Steps

- If your user-generated CRM-HL meshes are not already posted to the HLPW website, please provide them to us ASAP.
- Updates and corrections to submitted data will be accepted until **September 20<sup>th</sup>, 2024**
  - No new datasets, just updates to existing
- Workshop presentations and data will be downloadable from the HLPW website
- There will be **HLPW-5 special sessions** at **AIAA SciTech 2024** in Orlando
  - 35 technical papers in 6 sessions planned, including 6 summary papers
- Chris Rumsey will present a HLPW retrospective at 2024 ICAS conference in September – paper will be posted afterwards

# HLPW-6

- Clearly a need to continue HLPW – lots of outstanding issues and interesting areas to study!
- Many ways to go:
  - Revisit previous test cases to dig deeper
    - Test case 2 – has much left to explore (e.g., slat transition, tripping, flap separation)
    - Test case 3 – more participants, future test data
    - Flap deflection study from HLPW-4
  - Explore new areas
    - Icing
    - Landing gear or other component increments
    - More focus on in-tunnel computations
    - Aeroelastic deformation effects
    - Tunnel Effects
  - Deliberate attempts to choose problems relevant for specific TFGs – should test cases be TFG specific? Does each TFG need to hone down on a single KQ (more focus on a particular issue)?
- Observation: The test cases defined for HLPW-5 were largely chosen based on the *expected* test data from the CRM-HL ecosystem – future HLPWs perhaps need to consider test cases that are compelling with and *without* new test data (in case expected data isn't available as planned)

# How to Maintain Momentum?

- After past workshops, we typically “take a break” and stand-down completely for some time (~6 months or more) – participants need time to decompress from HLPW focus
- However, with so many ongoing issues and open questions around previous test cases, would some amount of low-level effort be valuable to the HLPW community?
  - Could be organized and managed within TFGs
  - Maybe rally around a given test case/issue (defined by a specific key question) and report effort through AIAA special sessions.
- How much time should pass before starting the next workshop?

# What role should RANS CFD play in future workshops?

- Need to incorporate RANS appropriately in future workshops
  - Evidence suggests RANS is not appropriate when moderate/large areas of flow separation are present
  - However, RANS generally performs well when flow is attached (linear portion of lift curve) when modeling is performed with best practices
  - So, perhaps we de-emphasize RANS for  $CL_{max}$ , but utilize RANS to study appropriate flow physics (e.g. boundary layer characteristics) and/or use in conjunction with HRLES and/or WMLES technology development
  - Specific focus problem / key question on mitigating ‘pizza slice’ separation?
  - Other ideas?

# What experimental datasets are crucial for future workshops?

- Data to characterize boundary layer transition across  $Re$  range
- Quantitative measurements of surface skin friction
- More advanced off-body flow measurements
  - Hot wire/hot film/laser Doppler anemometry, LDV, PIV, shear stress sensors, others?
- Analyze existing unsteady pressure measurements and assess what additional measurements are needed in the future
- Model deformation
- Off body features (vortices, wakes, etc.)
- Uncorrected Data / Wall Corrections
- Others?

# Acknowledgements

- Thank you to the **AIAA** and the **Applied Aerodynamics TC** for their sponsorship and support.
- Thank you to the **volunteers** and organizations, and especially the **TFG leaders** and **mesh generators**, who have contributed many hours of labor effort and/or resources over the last two years.
- Thanks to the **Oak Ridge National Laboratory** for providing computing time on Summit in 2023 to support many of the computations supporting HLPW-5.





# Announcements

- Jeff and Chris to “pass the torch”
  - **Adam and Li** will assume primary leadership of next workshop
  - **Looking for energetic volunteers** from the community to advance the goals of HLPW and help organize next and future workshops
- Chris to retire from NASA in October

