HLPW6: Scale-Resolving Simulation Technology Focus Group

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Meeting

June 30th, 2026

Schedule

- **Test Case 1** – CRM-HLS: Current Focus
  - Info**:** https://aiaa-hlpw.org/HLPW6/cases
  - Looking for willing participants to run **WRLES/DNS**.

- **Test Case 2** – ONERA LRM Landing Configuration: Planned
  - Focus on laminar-to-turbulent transition on slat and flap lift overprediction

- **Test Case 3** – ONERA LRM Takeoff Configuration: Tentative
  - Prediction of drag for a high-lift aircraft in takeoff configuration

- **Mini-Workshop 1**: AIAA Aviation 2026 (8-12 June, San Diego, CA)
- **Mini-Workshop 2**: AIAA SciTech 2027 (11-15 Jan, Orlando, FL)
- **HLPW6**: AIAA Aviation 2027 (7-11 June, San Diego, CA)

Recommendations & Updates from Mini-Workshop 1

Experimental data is needed to determine where $C_{L,max}$ occurs

- UW data on CRM-HLS to be collected and released in late 2026

Desire for **WRLES** results

- Including detailed post-processing (e.g., turbulence index on slat)

Desire for more **HRLES** results

- Determine whether low scatter is due to few submissions or higher accuracy of the method, especially at low AoA
- **POLL** – are we expecting HRLES results from additional participants soon?

Request a consensus RANS solution at $\alpha = 10° - 20°$

- Adam to discuss with Boris. Potential for an SRS "verification" exercise at AoA $= 10°$

Deeper dive into **transition sensor results**

- Requesting fully turbulent alpha sweep results from 013 & 014 on same grid as transition sensor results. AoA's should characterize the stall point.
- We will be requesting BL profiles to further diagnose differences
  - Konrad & SRS TFG leads to **define a standardized probe location** and update post-processing page on website

Updates from Participant Poll

22 PID’s assigned

9 datasets received for HLPW6 TC1

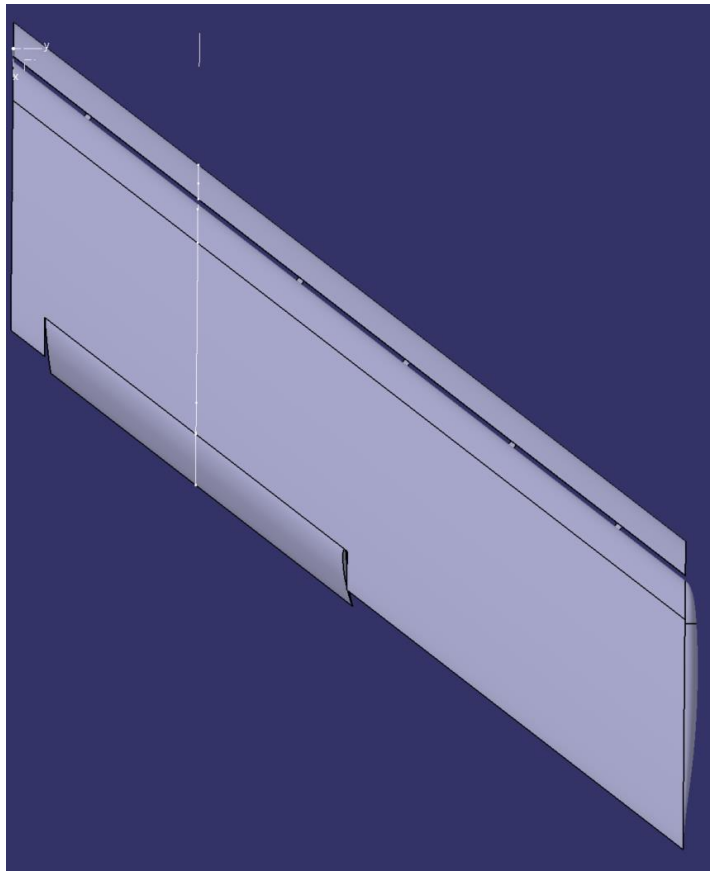
13 participants who received PID did not submit data for TC1

10 of them responded to my email inquiry

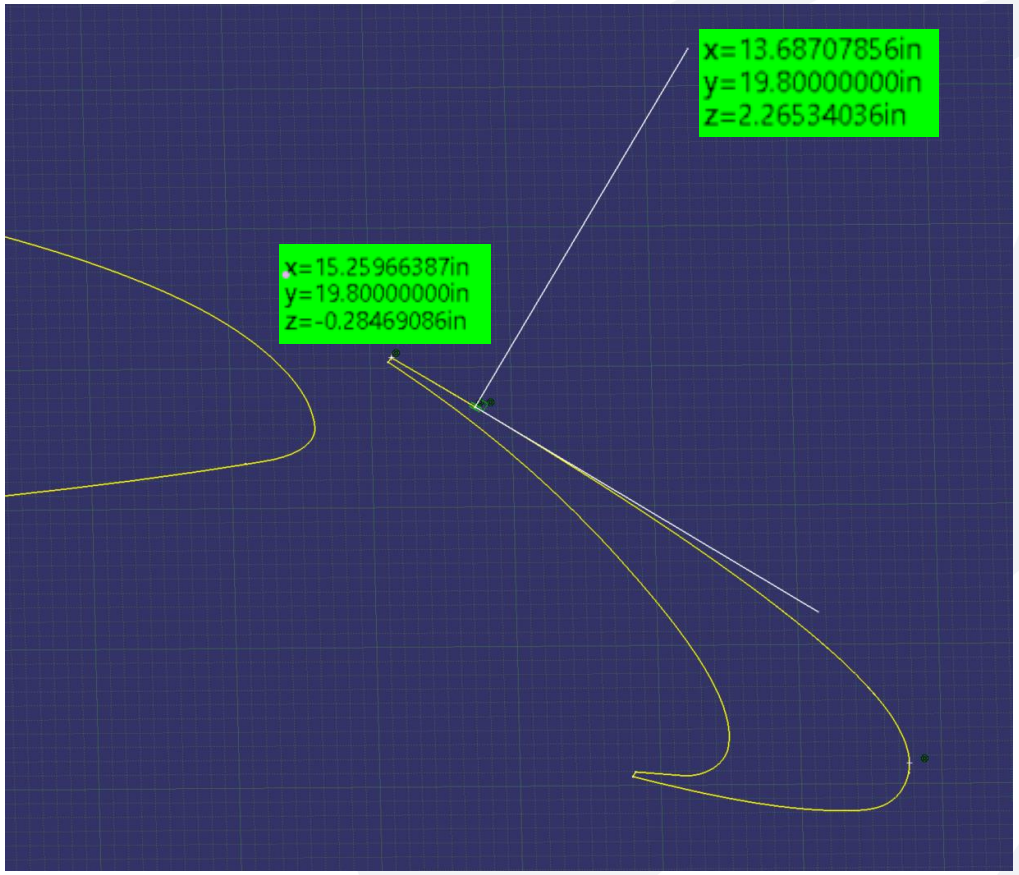
5 participants plan to run/submit TC1, 3 are a maybe, 2 are a no

Boundary Layer Probe Definition - Slat

Mid-span of the flap. $\eta = 0.275$



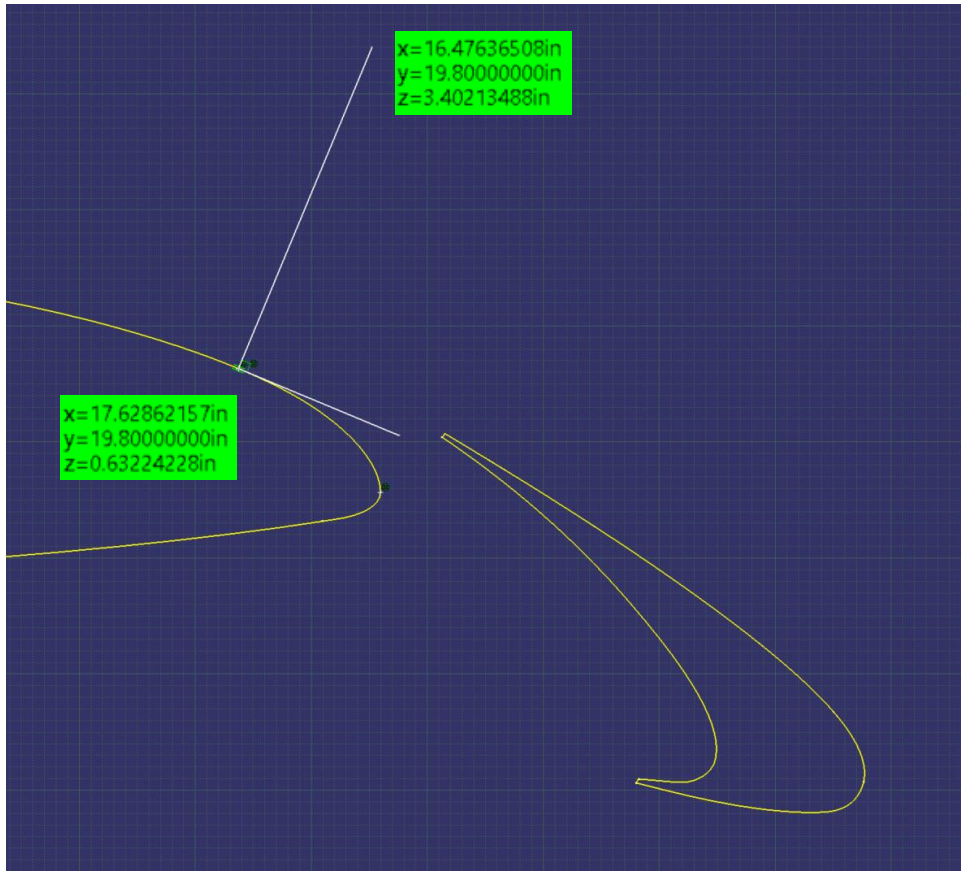
Probes are $10\%c$ or 3.0’’ long



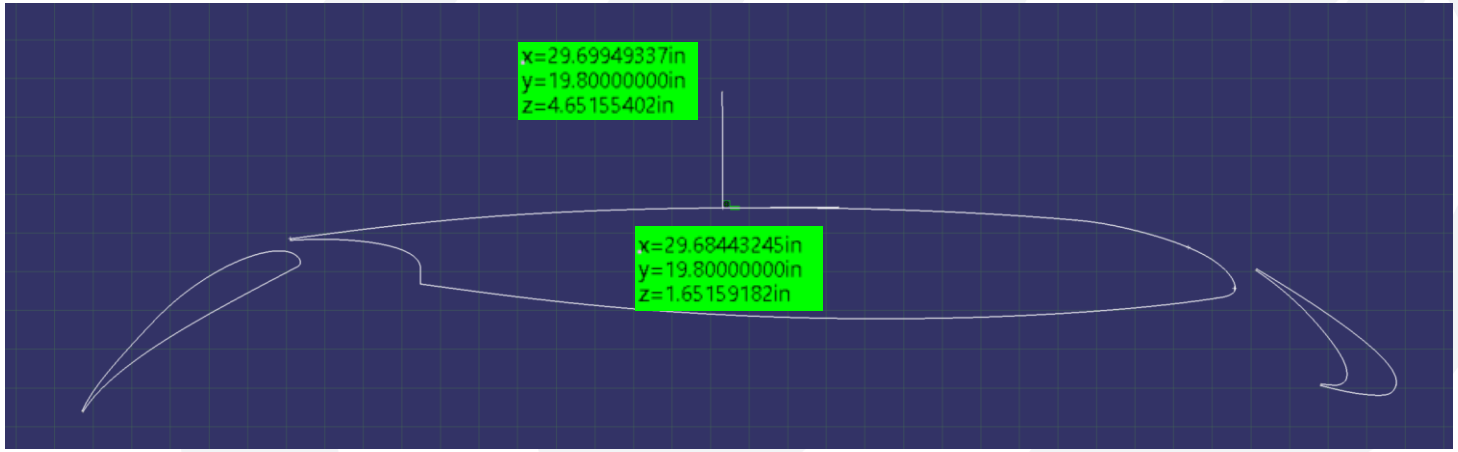
The location along the slat upper surface is at about 80% of the x-extent of the slat

Boundary Layer Probe Definition – Main Element

The location in the x-direction is at 5% of the main element chord



The location in the x-direction is at 50% of the main element chord



We will be asking for T, ux, uy, uz, p, and rho along the probes

Participant Progress Updates

Key Questions (Repeat)

General Key Questions

1. Are there meaningful distinctions in the predictive accuracy among the various types of scale-resolving methods (e.g. WMLES, DES, LBM)? What are the relative strengths/weaknesses of the methods in predicting aircraft maximum lift and the flow features that drive it (e.g. wing root separation, slat bracket wakes, flap separation)?
2. What is the state of affordability of scale resolving methods for high-lift prediction? Are these methods feasible for routine industrial use on modern compute hardware?
3. Are there certain types of turbulence model choices/frameworks that are needed to systematically improve the accuracy of high-lift flow predictions?
4. What choices regarding grid distribution/topology/density are needed to achieve accurate predictions of high-lift flows? What are the implications for different SRS methods of near-wall grid size (e.g. WMLES/HRLES running at y+ in the log layer)?

Test Case Specific Key Questions

1. TC1 (CRM-HLS, Jan 26-May 26): Can scale-resolving methods be used to provide a high-fidelity reference solution set for the High-Lift CRM Simplified Wing (CRM-HLS) model, including solutions on highly resolved meshes (potentially WRLES/DNS)?
2. TC1/TC2.1 (HLPW5 TC2.3/4, 3-4 AoA's near stall, June 26 – Jan 27): How should scale-resolving methods be handling laminar to turbulent transition, especially on the slat? How can the state of the leading-edge boundary layer predicted by scale-resolving methods be validated to build confidence in the predictions (e.g. using experimental or DNS/WRLES data)?
3. TC2.2 (HLPW5 TC2.3/4, 3 AoA's in linear CL curve range, June 26 – Jan 27): What can be done to improve the accuracy of scale resolving methods at low angles of attack, where inaccurate predictions of flap separation often lead to large mispredictions of aircraft lift?
4. TC3 (likely an ONERA takeoff config, Feb 27 – May 27): Are scale-resolving methods able to reliably predict aircraft drag at low angle of attack?