2nd AIAA CFD High Lift Prediction Workshop
Official Test Cases

Please check the website (http://hiliftpw.larc.nasa.gov) periodically for updates, and/or register with hiliftpw@gmail.com to be notified directly.

Geometry: EUROLIFT I DLR F11 High Lift Landing Configuration

For the required test cases, participants are asked to run on at least one supplied series of grids.

Case 1 (REQUIRED) – Grid Convergence Study
DLR F11 "Config 2" – Slat 26.5°, Flap 32° (Wing/body/HL system + SOB Flap Seal)
Unstructured, structured, and overset meshes provided by HiLiftPW committee

Flow solutions on a series of increasingly refined grids are required to assess grid convergence. If desired, participants can run on independently-generated grids (built to specifications described in the Gridding Guidelines). Flow solutions on the **Coarse, Medium, and Fine mesh are required**. An additional Extra-Fine mesh flow solution is optional.

Mach=0.175
Alpha= 7°, 16° **(OPTIONAL: 18.5°, 20°, 21°, 22.4°)**
Reynolds Number based on MAC^2: 15.1M (ETW^3)
Reference Static Temperature: 114.0°K (205.2°R)
Reference Static Pressure: 295000 Pa (42.7861 psi)
RUN FULLY TURBULENT

Case 2 – Reynolds Number Study
DLR F11 "Config 4" – Slat 26.5°, Flap 32° (Config #2 + Slat Tracks and Flap Track Fairings)
Flow solutions on comparable **Medium** mesh density from Grid Convergence Study
Unstructured and overset meshes provided by HiLiftPW committee

Case 2a (REQUIRED) – Low Reynolds Number Condition**
Mach=0.175
Alpha= 0°, 7°, 12°, 16°, 18.5°, 19°, 20°, 21°
Reynolds Number based on MAC^2: 1.35M ($B\text{-}LSWT^4$)
Reference Static Temperature: 298.6°K (537.48°R)
Reference Static Pressure: 100700 Pa (14.6053 psi)
RUN FULLY TURBULENT

Case 2b (REQUIRED) – High Reynolds Number Condition**
Mach=0.175
Alpha= 0°, 7°, 12°, 16°, 18.5°, 20°, 21°, 22.4°
Reynolds Number based on MAC^2: 15.1M (ETW^3)
Reference Static Temperature: 114.0°K (205.20°R)
Reference Static Pressure: 295000 Pa (42.7861 psi)
RUN FULLY TURBULENT

Case 2c (OPTIONAL) – Low Reynolds Number Condition with Transition
Mach=0.175
Alpha= 0°, 7°, 12°, 16°, 18.5°, 19°, 20°, 21°
Reynolds Number based on MAC^2: 1.35M ($B\text{-}LSWT^4$)
Reference Static Temperature: 298.6°K (537.48°R)
Reference Static Pressure: 100700 Pa (14.6053 psi)
RUN with SPECIFIED TRANSITION and/or TRANSITION PREDICTION METHODS

****Note: The committee is not providing point-matched structured grids for Case 2. Therefore Cases 2a and 2b are optional for participants with point-matched structured-grid codes.**

Case 3 (OPTIONAL) – Full Configuration Study
DLR F11 "Config 5" – Slat 26.5°, Flap 32° (Config #4 + Slat Pressure Tube Bundles)
Flow solutions on comparable **Medium** mesh density from Grid Convergence Study
Unstructured mesh provided by HiLiftPW committee

Case 3a – Low Reynolds Number Condition
Mach=0.175
Alpha= 0°, 7°, 12°, 16°, 18.5°, 19°, 20°, 21°
Reynolds Number based on MAC[2]: 1.35M (B-LSWT[4])
Reference Static Temperature: 298.6°K (537.48°R)
Reference Static Pressure: 100700 Pa (14.6053 psi)
RUN FULLY TURBULENT and/or RUN with TRANSITION

Case 3b – High Reynolds Number Condition
Mach=0.175
Alpha= 0°, 7°, 12°, 16°, 18.5°, 20°, 21°, 22.4°
Reynolds Number based on MAC[2]: 15.1M (ETW[3])
Reference Static Temperature: 114.0°K (205.20°R)
Reference Static Pressure: 295000 Pa (42.7861 psi)
RUN FULLY TURBULENT and/or RUN with TRANSITION

Case 4 (OPTIONAL) – Turbulence Model Grid-Convergence Verification Study
2-D bump from http://turbmodels.larc.nasa.gov/bump.html.
The purpose of this case is to investigate the consistency in implementation of turbulence models in a controlled study. The grids supplied at the above website must be used. Mach=0.2, Re=3 million per unit length, Tref=540R. Participants must run *at least* the finest 3 supplied grids. *RUN FULLY TURBULENT*.

NOTES:

1. All DLR F11 simulations are "free air"; no wind tunnel walls or model support systems are to be included. In other words, it is expected that the half-model be computed with symmetry boundary conditions on the symmetry plane and farfield boundary conditions at the outer boundaries.
2. MAC = Mean Aerodynamic Chord = 347.09 mm
3. ETW = European Transonic Wind Tunnel, Cologne
4. B-LSWT = Airbus Low Speed Wind Tunnel, Bremen