

Summary of Case 1 meshes for HLPW-5

As of 11/14/2023

TEST CASE 1 is Wing-Body Verification

Most of the provided grids are "free air" (half-model with symmetry plane in free air). They are given a Mesh Series designation X.a.YY. The X indicates the test case number (1, 2, or 3). The a indicates the grid type (R=fixed-grid RANS, A=ADAPT, H=High-Order, L=HRLES, W=WMLLES). The YY is used to order the meshes within a category; these are simply numbers starting at 01 and incrementing up. If any grid series gets superseded by a revision, this will be designated by a () in its designation. For example, version 2 would be designated by (2).

In-tunnel grids are indicated with "T" designation at the end.

Disclaimer: The grids available for download may or may not be appropriate for your solver, and may or may not be of sufficient density and quality to yield accurate results. You must judge for yourself.

Note that the mesh sequences have been given somewhat arbitrary labels by their creators regarding their size: sometimes by sequential letter (A, B, C,...), sometimes by increasing number, and sometimes by XC,C,M,F. These are all arbitrary designations with little practical meaning, and there is no consistency between different mesh series. Mesh size comparisons should instead be gauged by looking at the README files.

IMPORTANT: Please double-check the BCs in any grid that you download. We have noticed small mistakes/typos/inconsistencies occasionally.

RANS grids

1.R.01 (POINTWISE, mixed element unstructured)

- 1v – 2.6M cells, 1.0M nodes
- 3v – 12.8M cells, 5.3M nodes
- 5v – 36.1M cells, 15.4M nodes
- 7v – 78.0M cells, 34.0M nodes
- 9v – 143.9M cells, 63.4M nodes
- 11v – 239.8M cells, 106.5M nodes
- 13v – 370.5M cells, 165.4M nodes
- 15v – 541.4M cells, 242.6M nodes
- 17v – 757.9M cells, 340.6M nodes

1.R.02 (POINTWISE, same point distribution as 1.R.01, except cells are all tetrahedra)

- 1v – 5.6M cells, 1.0M nodes
- 3v – 31.3M cells, 5.3M nodes
- 5v – 91.9M cells, 15.4M nodes
- 7v – 202.7M cells, 34.0M nodes

9v – 378.8M cells, 63.4M nodes
11v – 636.7M cells, 106.5M nodes
13v – 989.5M cells, 165.4M nodes

1.R.03 (HELDENMESH, mixed element unstructured)

C – 2.7M cells, 1.1M nodes
M – 18.4M cells, 7.6M nodes
F – 136M cells, 58.1M nodes

1.R.04 (ANSYS ICEM-CFD, all hex elements)

1v – 0.92M cells, 0.95M nodes
3v – 5.80M cells, 5.88M nodes
5v – 15.2M cells, 15.4M nodes
7v – 33.1M cells, 33.4M nodes
9v – 64.6M cells, 65.0M nodes
11v – 106.8M cells, 107.4M nodes
13v – 162.6M cells, 163.4M nodes
15v – 242.4M cells, 243.4M nodes

1.R.05 (HELDENMESH, mixed element unstructured ("optimized" compared to 1.R.03))

C – 2.63M cells, 0.86M nodes
M – 17.8M cells, 5.8M nodes
F – 131M cells, 42.9M cells
R – 1.01B cells, 331M nodes

1.R.06 (HELDENMESH, same point distribution as 1.R.05, except all tetrahedra)

C – 5.04M cells, 0.86M nodes
M – 34.2M cells, 5.8M nodes
F – 254M cells, 42.9M nodes
R – 1.97B cells, 331M nodes

1.R.07 (HELDENMESH 4.14, mixed element unstructured)

Coarse – 12.0M cells, 5.0M nodes
Medium – 31.2M cells, 13.4M nodes
Fine – 87.1M cells, 38.9M nodes
XFine – 232.4M cells, 105.6M nodes
UFine – 415.1M cells, 191.0M nodes

1.R.08 (POINTWISE, mixed element unstructured with prism/tet cells, all tris on surface)

B – 11.6M cells, 5M nodes
C – 34.2M cells, 15.4M nodes
D – 68.2M cells, 31.3M nodes
E – 199.8M cells, 93.4M nodes

1.R.09 (POINTWISE, mixed element unstructured with hex-dominant cells, quad dominant on surface)

B – 14.2M cells, 6.6M nodes
C – 33.5M cells, 21.5M nodes
D – 77.6M cells, 54.6M nodes
E – 246.5M cells, 192.1M nodes

ADAPT grids

1.A.01 (INRIA pyAMG, adapted tetrahedral unstructured)

- C – 95.1M cells, 16.6M nodes
- M – 164.6M cells, 28.7M nodes
- F – 286.4M cells, 49.9M nodes

HO grids

1.H.01 (ANSA, all tet, Q2 isotropic, intended for WMLES)

- A – 1.5M cells, 2.1M nodes
- B – 2.8M cells, 4.4M nodes
- C – 10.1M cells, 16.0M nodes

1.H.02 (ANSA, all tet, Q2 with layers, intended for WMLES)

- A – 3.5M cells, 4.9M nodes
- B – 15.5M cells, 21.3M nodes

1.H.03(2) (BSC curving solver, all tet, Q2 and Q3, intended for WMLES (version 2))

- Q2
 - Coarse – 1.7M cells, 2.6M nodes
 - Fine – 3.9M cells, 5.6M nodes

- Q3
 - Coarse – 1.7M cells, 8.3M nodes
 - Fine – 3.9M cells, 18.5M nodes

- Q4
 - Coarse – 1.7M cells, 19.3M nodes
 - Fine – 3.9M cells, 43.3M nodes

1.H.04(4) (ANSA, all tet, Q2 with layers, intended for RANS (version 4))

- Aminus – 2.4M cells, 3.4M nodes
- A – 5.0M cells, 7.0 M nodes
- B – 14.2M cells, 19.8M nodes

1.H.05 (Pointwise, variety of Q2 and Q3 meshes, intended for RANS)

- A variety of sizes are provided

HRLES grids

1.L.01 (ANSA, hex-dominant)

- A – 7.0M cells, 5.8M nodes
- B – 16.1 M cells, 14.0M nodes
- C – 42.0M cells, 37.5M nodes
- D – 80.5M cells, 73.1M nodes
- E – 202.4M cells, 187.5M nodes

WMLES grids

1.W.01 (HELDENMESH, mixed element unstructured)

XC – 95M cells, 39.3M nodes
C – 540M cells, 229M nodes
M – 3.29B cells, 1.42B nodes