MC1 - High-Order Meshing for the High-Lift Common Research Model

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Summary

The high-lift CRM configuration has been jointly designed by NASA and Boeing to serve as a test case for high-lift simulation. The geometry is representative for a wide-body commercial aircraft with a classical three element high lift system at the wing leading and trailing edge in a landing setting. This version of the geometry, which consists of a body, wing, and three flaps, but no attachment hardware, was introduced for the Third High Lift Prediction Workshop (HiLPW3) https://hiliftpw.larc.nasa.gov/ and the accompanying first Geometry and Mesh Generation Workshop http://www.pointwise.com/gmgw/.

Requirements

The configuration used here is the one with a fully open gap between the two trailing edge flaps (case 1a). Multiple different file formats for the Gapped Configuration are avilable here at the high-lift prediction workshop https://hiliftpw.larc.nasa.gov/Workshop3/geometries.html.

Two types of contributions are expected:

Meshes

Participants are expected to demonstrate a methodology to generate hybrid curved meshes, including high aspect ratio extrusion boundary layers, with at least a quadratic representation of the boundary. HiLPW3 provided meshing guidelines designed for second-order methods https://hiliftpw.larc.nasa.gov/Workshop3/GriddingGuidelines-HiLiftPW3-v10.pdf. Participants need not follow these guidelines, and in fact likely should not, for meshes designed for high-order schemes. Each submission should provide a refinement sequence of at least three meshes and should describe in detail how mesh sizing criteria were modified relative to the HiLPW3 guidelines. These should be provided to the test case organizer by [date]. Participants

should submit their meshes in GMSH or CGNS format; if neither of these appears feasible please contact Carl Ollivier-Gooch at the email address above to discuss options.

Computations

Participants are expected to provide a single simulation for each of the flight conditions specified for Case 1a (α=8) by HiLPW3 https://hiliftpw.larc.nasa.gov/Workshop3/testcases.html. The required data follows the specification of the aforementioned workshop.

Features and challenges

Curved geometry
Mesh generation
Subsonic flow
Turbulent flow
Reynolds Averaged Navier Stokes (RANS)