

Summary of the Third AIAA CFD Drag Prediction Workshop

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Abstract

Results from the Third AIAA Drag Prediction Workshop (DPW-III) are summarized. The workshop focused on the prediction of both absolute and differential drag levels for wing-body and wing-alone configurations that are representative of transonic transport aircraft. The baseline DLR-F6 wing-body geometry, previously utilized in DPW-II, is also augmented with a side-of-body fairing to help reduce the complexity of the flow physics in the wing-body juncture region. In addition, two new wing-alone geometries have been developed for DPW-III. Numerical calculations are performed using industry-relevant test cases that include lift-specific and fixed-alpha flight conditions, as well as full drag polars. Drag, lift and pitching moment predictions from numerous Reynolds-Averaged Navier-Stokes computational fluid dynamics methods are presented, focused on fully-turbulent flows. Solutions are performed on structured, unstructured, and hybrid grid systems. The structured grid sets include point-matched multi-block meshes and over-set grid systems. The unstructured and hybrid grid sets are comprised of tetrahedral, pyramid, and prismatic elements. Effort was made to provide a high-quality and parametrically consistent family of grids for each grid type about each configuration under study. The wing-body families are comprised of a coarse, medium, and fine grid, while the wing-alone families also include an extra-fine mesh. These mesh sequences are utilized to help determine how the provided flow solutions fair with respect to asymptotic grid convergence, and are used to estimate an absolute drag of each configuration.

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