MRL and USF Contribution to HiLiftPW-2

N. N. Thusiast*

Multielement Research Lab, Mail Stop 000, Happy Forks, VA 00000

email: m.n.thusiast@mrl.gov, (777) 777-7777

Soar N. Air†

University of Southern Flight, Mail Code 98765, Lofty Heights, TX 00000

email: s.n.air@usf.edu, (888) 888-8888

We intend to participate in the HiLiftPW-2, to be held June 22-23, 2013 in San Diego, CA. We plan to perform the following sets of computations:

1. **Case 1 - Grid Convergence Study**
   - **Code: STRUCTOVER-CFD-3D**
   - **Grid: supplied by HiLiftPW-2 committee**
   - **Turbulence model: Menter SST-V**
2. **Cases 1, 2a, and 2b - Grid Convergence Study and Reynolds Number Study**
   - **Code: UNSTRUCT-CFD-3D**
   - **Grid: Created in-house using GRIDMAKE3D, containing mixed elements of prisms and tets – to be uploaded to the committee**
   - **Turbulence model: Spalart-Allmaras**
3. **Cases 3a and 3b - Full Configuration Study (time permitting)**
   - **Code: UNSTRUCT-CFD-3D**
   - **Grid: Same as No. 2 above**
   - **Turbulence model: Langtry-Menter gamma-retheta transition model**
4. **Case 4 - Turbulence model verification study**
   - **Code: UNSTRUCT-CFD-3D**
   - **Grid: Series of 3 finest grids as defined on http://turbmodels.larc.nasa.gov/bump.html**
   - **Turbulence models: Spalart-Allmaras and Menter SST-V**

We will submit our results electronically by the deadline to the HiLiftPW-2 committee.

STRUCTOVER-CFD-3D is a Reynolds-averaged Navier-Stokes (RANS) code developed by Et et al.,[1] widely used at the Multielement Research Lab. It is specifically formulated to work with overset grids on three-element wing configurations. It is an upwind finite-volume structured code.

UNSTRUCT-CFD-3D is an unstructured finite difference code for both RANS and hybrid RANS-LES. The code was developed at the University of Southern Flight.[2] It employs 6th order central differencing in space and 3rd order temporal differencing, along with 9th order explicit filtering.

References

[1] Et, H., Cet, P., and Era L., "Description of STRUCTOVER-CFD-3D," *Journal of Codes*, Vol. 6, No. 5, 1994, pp. 5–21.

[2] Author, A. and Author B., "Description of UNSTRUCT-CFD-3D," *Journal of Lengthy Papers*, Vol. 9, No. 2, 2008, pp. 22–1021.

*Corresponding Author. Senior Research Scientist, High Lift Branch.

†Professor and Chair, Dept. of Aeronautical Engineering.