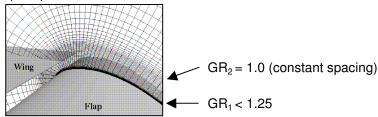# 1st AIAA CFD High Lift Prediction Workshop
Gridding Guidelines

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

Guidelines:
- a) Initial spacing normal to all viscous walls (RE = 4.3M based on C_{REF}=39.6"):
    - 1) coarse: $y^+ \sim 1.0$ dy = 0.00020"
    - 2) medium: $y^+ \sim 2/3$ dy = 0.00013"
    - 3) fine: $y^+ \sim 4/9$ dy = 0.00009"
    - 4) extra-fine: $y^+ \sim 8/27$ dy = 0.00006"
- b) Recommend grids have at least 2 cell layers of constant spacing normal to viscous walls
- c) Total grid size to grow ~3X between each grid level for grid convergence cases
    - 1) For structured meshes, this growth is ~1.5X in each coordinate direction
- d) Grid convergence cases must maintain the same grid family between grid levels, i.e. maintain the same stretching factors, same topology, etc.
- e) Recommend variable off-body cell growth rates for wing and flap grids
    - 1) Growth rate in the viscous layer (GR_1) should be < 1.25 for all grids
    - 2) To capture the wake from upstream elements, the wing and flap grids should include a region where the growth rate (GR_2) is 1.0

GR$_2$ = 1.0 (constant spacing)

GR$_1$ < 1.25

- 3) The length of the region with constant spacing should be roughly 2X the size of the slat/flap gap at the wing root ⇨ slat/flap gap = 0.015 or ~0.8" at the root
- f) Farfield located at ~100 C_{REF}'s for all grid levels
- g) For the Medium Grids:
    - 1) Chordwise spacing at leading edge (LE) and trailing edge (TE) ~0.1% local device chord (use local slat chord for slat grid, wingbox chord for wingbox grid and flap chord for flap grid)
    - 2) Spanwise spacing at root ~0.1% local semispan
    - 3) Spanwise spacing at tip ~0.1% local semispan
    - 4) Cell size near body nose and tail ~2.0% C_{REF}
- h) For the Coarse and Fine Grids, the above values should be scaled accordingly
- i) The TE base grid should contain:
    - 1) A minimum of 4 cells across TE base for the coarse mesh
    - 2) A minimum of 6 cells across TE base for the medium mesh
    - 3) A minimum of 9 cells across TE base for the fine mesh
    - 4) A minimum of 14 cells across TE base for the extra-fine mesh
- j) Be multi-grid friendly
- k) For unstructured grids designed for vertex based solvers, the spacings refer to inter-nodal spacings and the resulting grid sizes are expected to be similar to the structured grid sizes above. For unstructured grids for cell- centered solvers, the spacings refer to spacings between cell centers (or surface face centers), which corresponds approximately to a factor of 2 reduction in the overall number of surface points compared to the nodal solver case, for a triangular surface grid (this is based on triangle centroid separation distance of 2/3h). For tetrahedral cell-centered-solver meshes, the total number of grid points will be approximately 1/3 of the numbers listed above.