

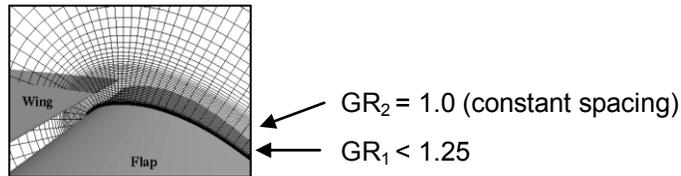
2nd AIAA CFD High Lift Prediction Workshop

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) Approximate initial spacing normal to all viscous walls (**Re=15.1M** based on $C_{REF}=MAC=347.09$ mm):
 - 1) coarse: $y^+ \sim 1.0$ $dy \sim 0.00055$ mm
 - 2) medium: $y^+ \sim 2/3$ $dy \sim 0.00037$ mm
 - 3) fine: $y^+ \sim 4/9$ $dy \sim 0.00024$ mm
 - 4) extra-fine: $y^+ \sim 8/27$ $dy \sim 0.00016$ mm
- b) Grid spacing normal to symmetry plane should be considerably larger than viscous wall spacing.
- c) Same grids to be used for low Re (1.35M) cases.
- d) Recommend grids have at least 2 cell layers of constant spacing normal to viscous walls.
- e) Total grid size to grow $\sim 3X$ between each grid level for grid convergence cases.
 - 1) For structured meshes, this growth is $\sim 1.5X$ in each coordinate direction.
- f) Grid convergence cases must maintain the same grid family between grid levels, i.e. maintain the same stretching factors, same topology, etc.
- g) 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.



- 3) The length of the region with constant spacing should be roughly 2X the size of the slat/flap gap at the wing root.
- h) Farfield located at least 100 C_{REF} 's for all grid levels.
- i) For the Medium Grids:
 - 1) Chordwise spacing at leading edge (LE) and trailing edge (TE) $\sim 0.1\%$ local device chord (use local slat-element chord for slat grid, wing-element chord for wing grid and flap-element chord for flap grid).
 - 2) Spanwise spacing at root $\sim 0.1\%$ semispan.
 - 3) Spanwise spacing at tip $\sim 0.1\%$ semispan.
 - 4) Cell size near body nose and tail $\sim 1.0\% C_{REF}$.
- j) For the Coarse and Fine Grids, the above values should be scaled accordingly.
- k) The TE base grid should contain:
 - 1) A minimum of 4 cells (5 points) across TE base for the coarse mesh.
 - 2) A minimum of 6 cells (7 points) across TE base for the medium mesh.
 - 3) A minimum of 9 cells (10 points) across TE base for the fine mesh.
 - 4) A minimum of 14 cells (15 points) across TE base for the extra-fine mesh.
- l) Structured grids should be multi-grid friendly.
- m) 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 comparable structured grid sizes. 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 $2/3h$).