DPW-VII
Opening Remarks

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DPW-VII: Baseline RANS Grid Family Plan

Name	L	WB	Δy_1	Y^+	$^{\#}\Delta y_1 s$
Tiny (T)	1	~5	0.0002332”	~1.00	2
Coarse (C)	2	~17	0.0001555”	~0.67	3
Medium (M)	3	~40	0.0001166”	~0.50	4
Fine (F)	4	~78	0.0000933”	~0.40	5
Extra Fine (X)	5	~135	0.0000777”	~0.33	6
Ultra Fine (U)	6	~215	0.0000666”	~0.29	7

Rough Nominal Size of Grid System in M-DOF

At Least 4 Sequential Mesh Levels & Bias Towards Finest

DPW-VII: Gridding Guidelines (1/2)

- **Tiny Grid**
  - Viscous Wall Spacing: $Y^+ \sim 1.0 \rightarrow \Delta y_1 = 0.0002332$”
    - Based on local C_f @ 10% Cref for Re_c = 30 million
    - $C_f \sim 0.455 / \ln^2(0.06*Re_x) = 0.003107$, where $Re_x = 0.1*Re_c$ = 3 million
    - $\Delta y_1 =$ Cref / [Re_c*sqrt(C_f/2)] = 0.0002332”
  - At Least 2 Constantly-Spaced Cells at Viscous Walls, $\Delta y_2 = \Delta y_1$
  - Growth Rates < 1.2X Normal to Viscous Walls
  - Wing Spanwise Spacing < 0.1%*Semispan at Root & Tip
  - Wing Chordwise Spacing < 0.1%*C (Local Chord) at LE & TE
  - Wing TE Base >> 8 Cells
  - Spacing Near Fuselage Nose & End-of-Body < 1%*Cref
- **Grow Next-Finer Grid in Family by ~ $[(L+2)/(L+1)]^3$ in Size**
  - Scale Dimensions in All Three Directions by ~ [(L+2)/(L+1)]
  - Grid Spacings Should Reduce as follows, (0.1% in Tiny Grid)
    - [T,C,M,F,X,U] = [0.100, 0.067, 0.050, 0.040, 0.033, 0.029]%

DPW-VII: Gridding Guidelines (2/2)

- **Farfield Boundary > 100*Semispans**
- **Miscellaneous Notes:**
  - Try to be Multigrid Friendly on Structured Meshes
  - Store Grid Coordinates in 64-bit Precision
  - If Storing Grids in Plot3D Format, Keep Zones < 38M Nodes
  - Itemize Surface Elements by Components [W, B, Sym, Far]
  - Itemize Element Count for Unstructured Meshes
    - Volume: Tetrahedra, Prisms, Pyramids, Hexahedra
    - Surface: Triangles, Quads
  - Total of 15 Grids Needed per Grid Type
    - Subtotal of 8 AE Medium Grids @ Low-Q for Alpha Sweep
    - Subtotal of 1 AE Medium Grid @ High-Q for Q Effect
    - Subtotal of 1 Medium Grid on Undeflected Geometry for Case 6
    - Subtotal of 6 Grids in Grid Family for Grid Convergence
      - AE3.00degLowQ Geometry, CL = 0.58, Re = 20M, (Re = 5M Optional)