

NASA Langley Research Center Contribution to High Angle Working Group

AIAA Drag Prediction Workshop 8 / Aeroelastic Prediction Workshop 4
June 7th, 2026

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Workshop Cases

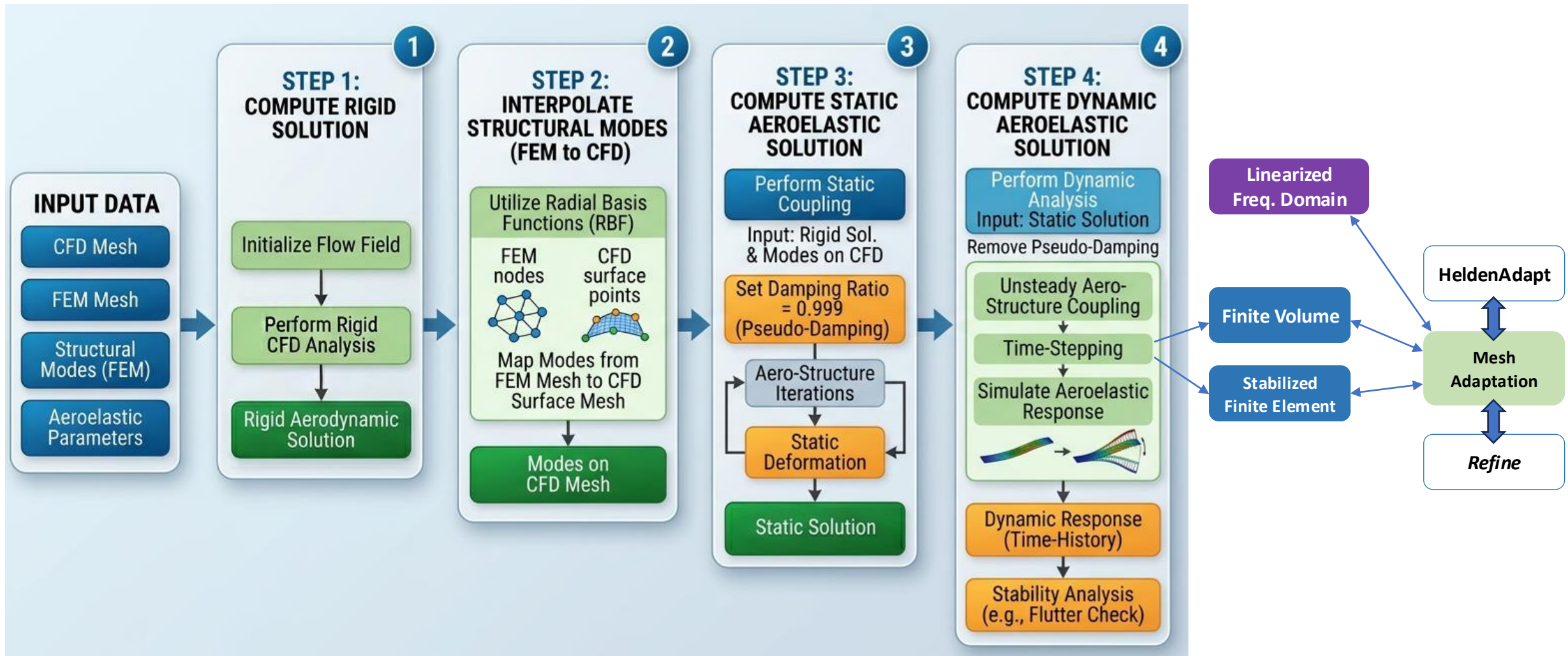


Case 1: 3D wing flutter prediction at Mach 0.80 and angle-of-attack sweep: $0^\circ - 6^\circ$

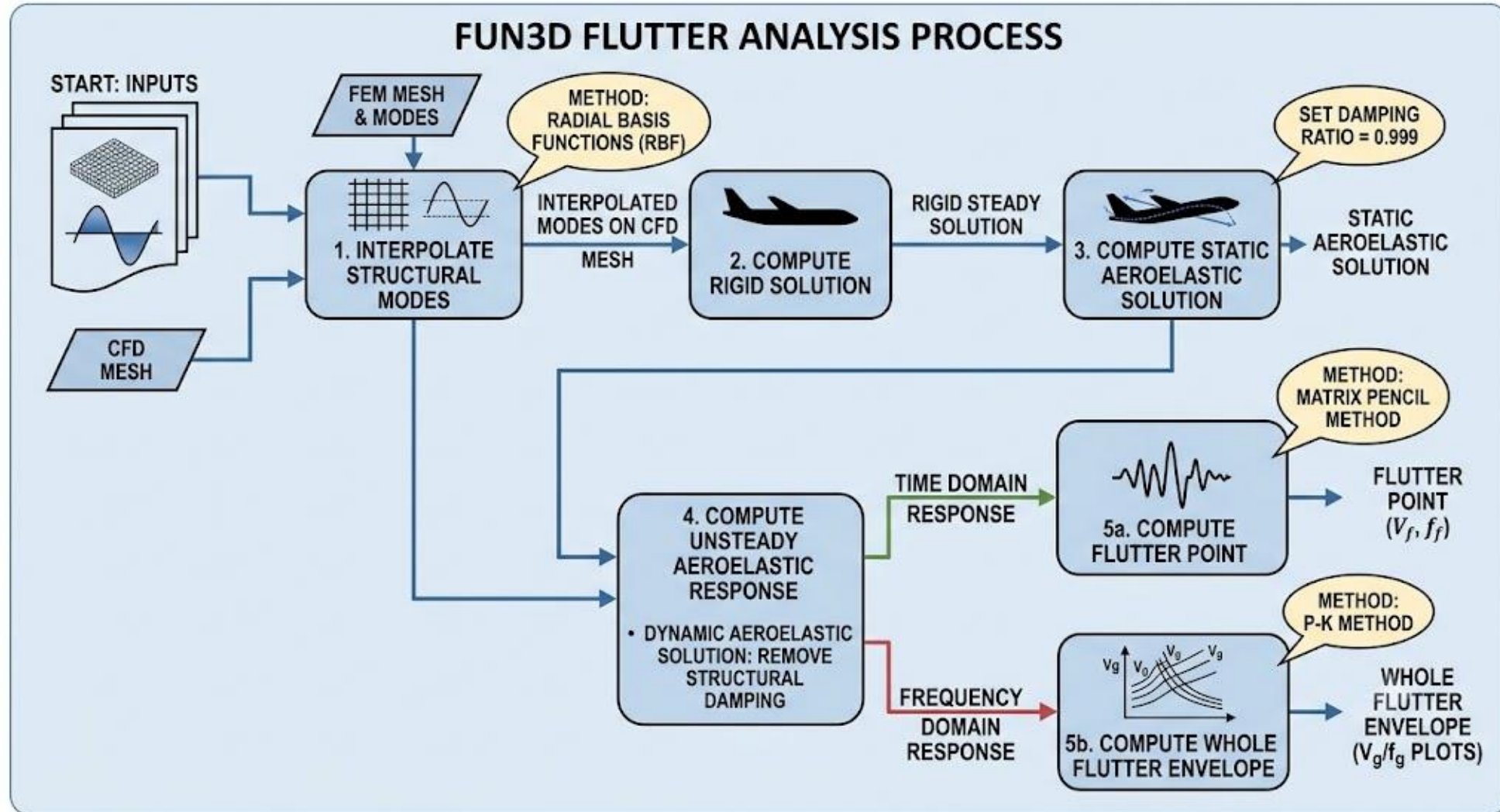
Case 2: 3D wing flutter prediction at Mach 0.74, 0.76, 0.78 and angle-of-attack 3°

Case 3: 2D wing flutter prediction at Mach 0.80 and angle-of-attack sweep: $0^\circ - 6^\circ$

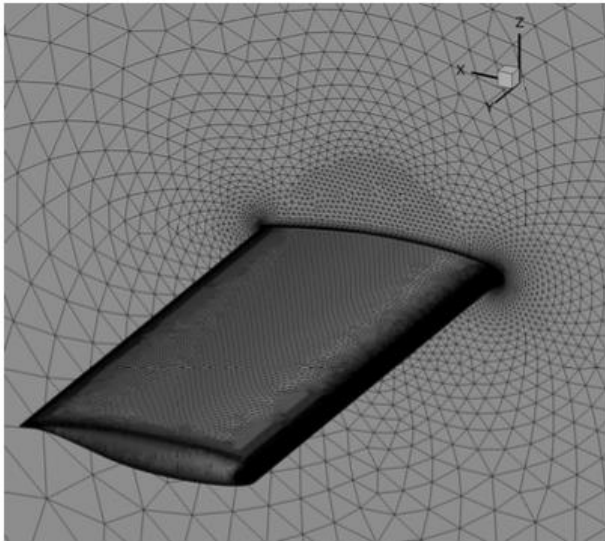
FUN3D Workflow



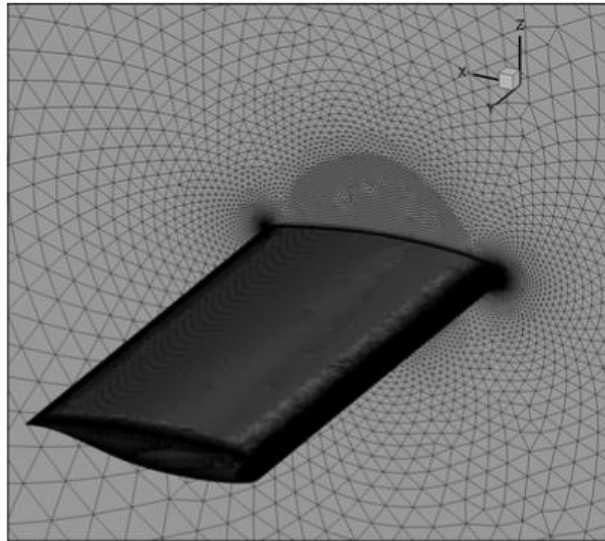
FUN3D Workflow



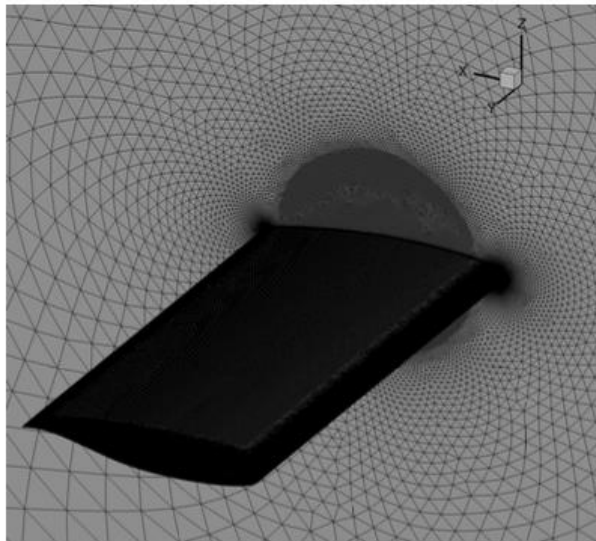
Case 1: 3D BSCW



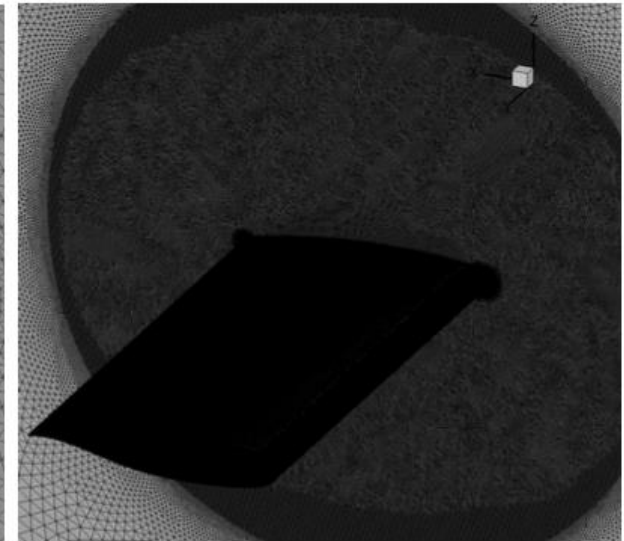
(a) Coarse grid, 3M nodes.



(b) Medium grid, 9M nodes.



(c) Fine grid, 27M nodes.

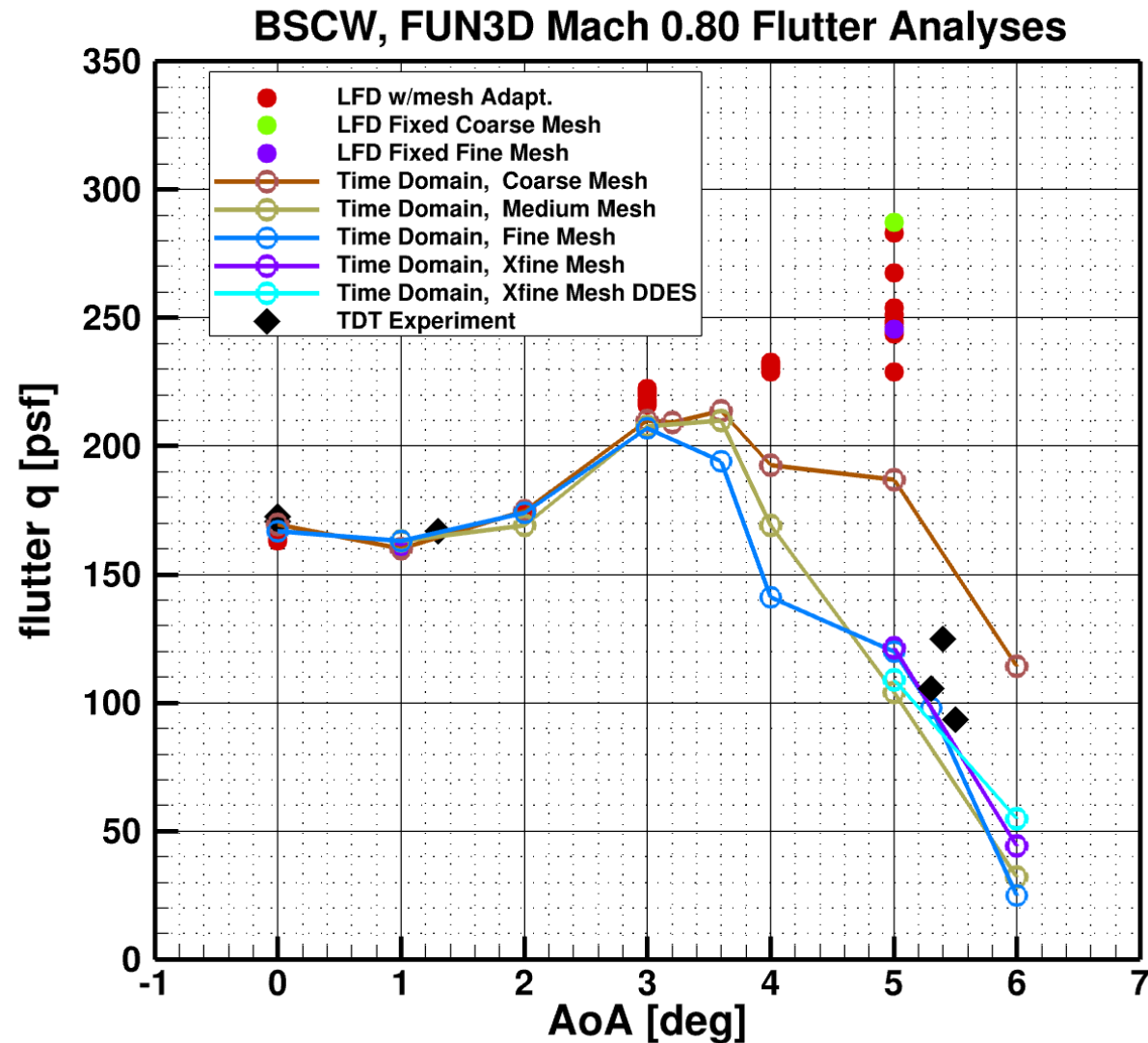


(d) Xfine grid, 99M nodes.

Case 1: 3D BSCW



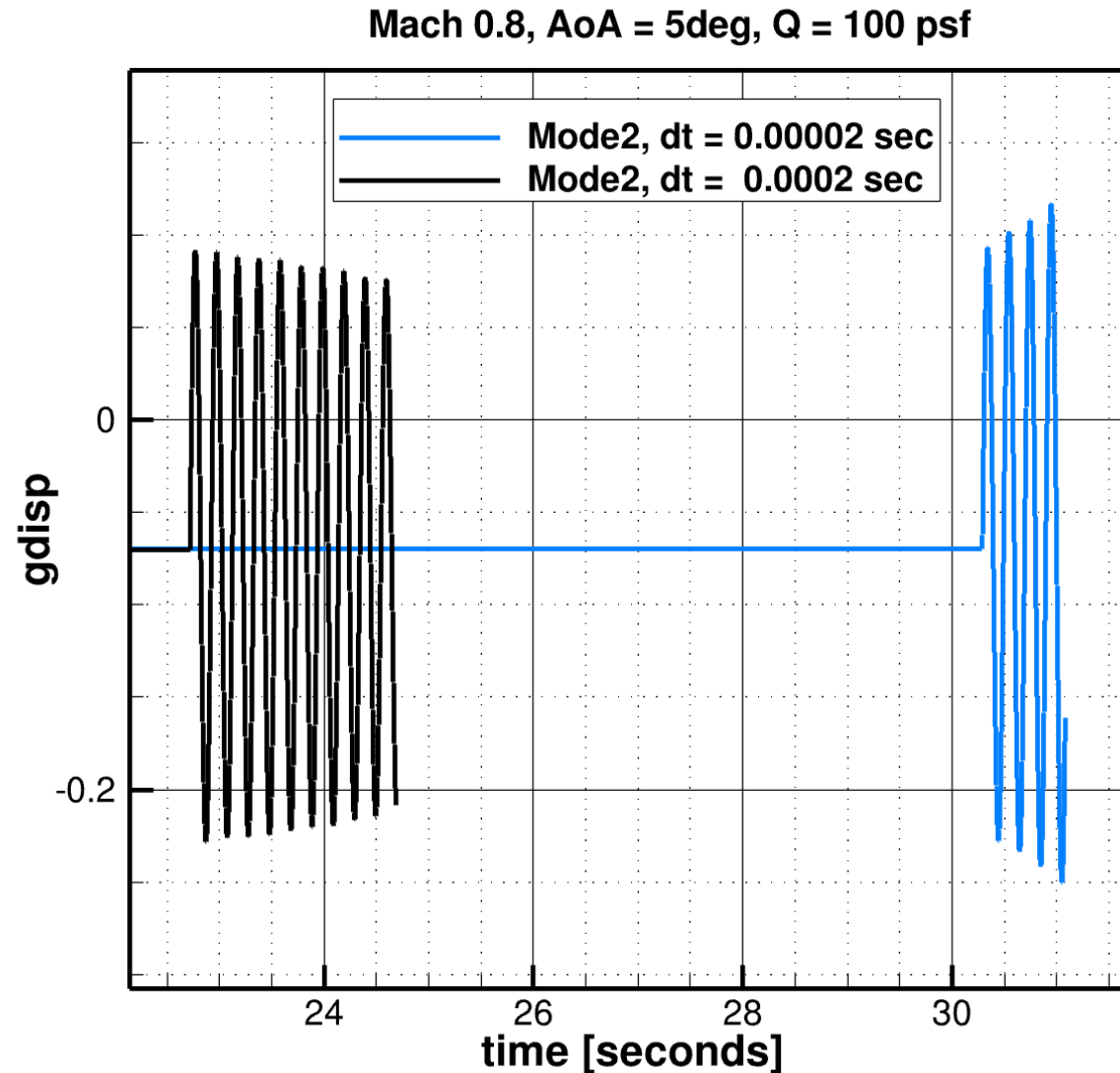
- SA turbulence model
- Roe flux difference splitting
- Venkatakrishnan flux limiter
- $\Delta t = 0.0002$ seconds, URANS
- $\Delta t = 0.00002$ seconds, DDES



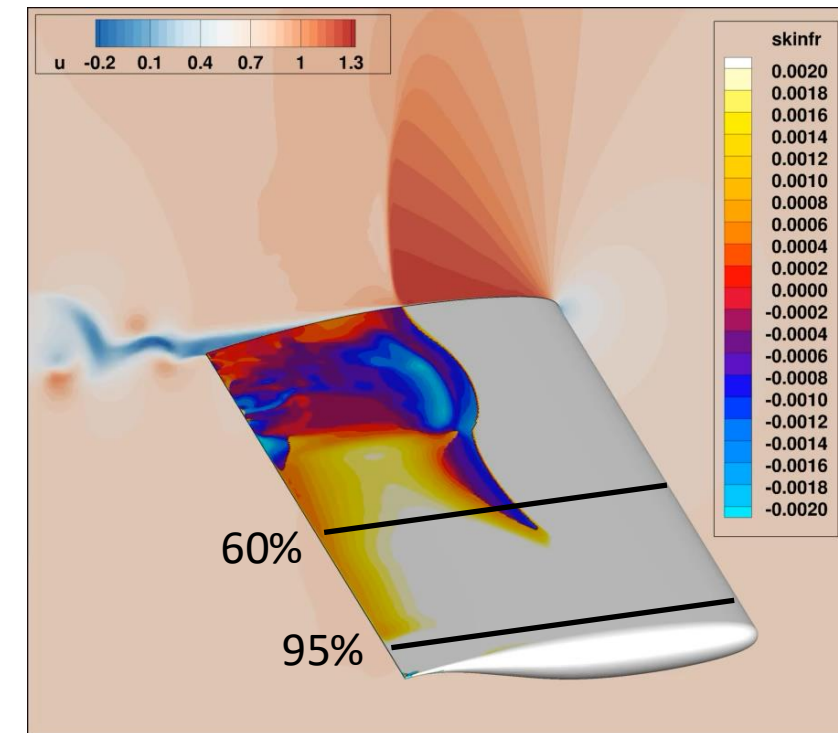
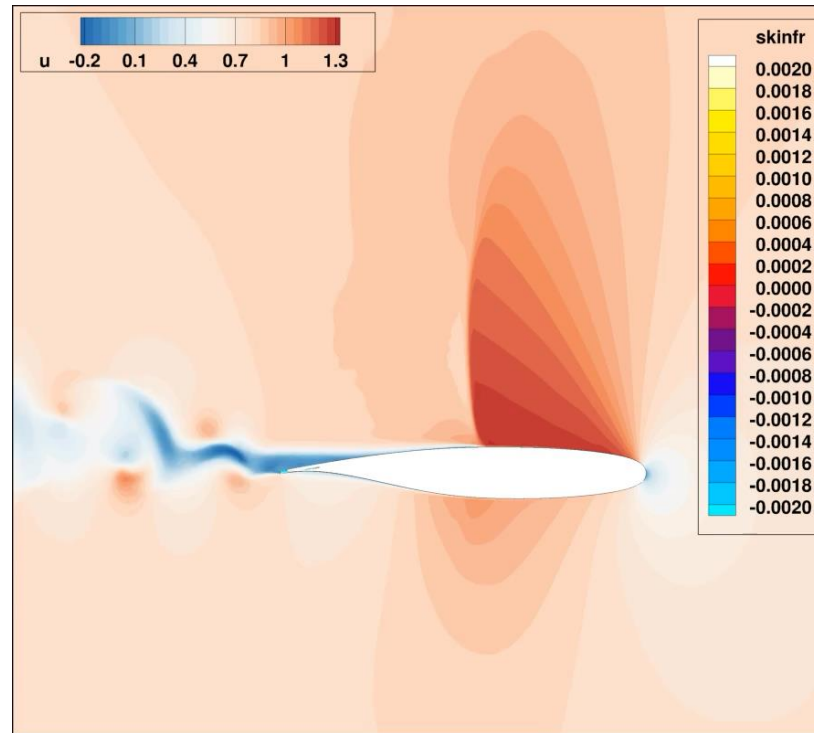
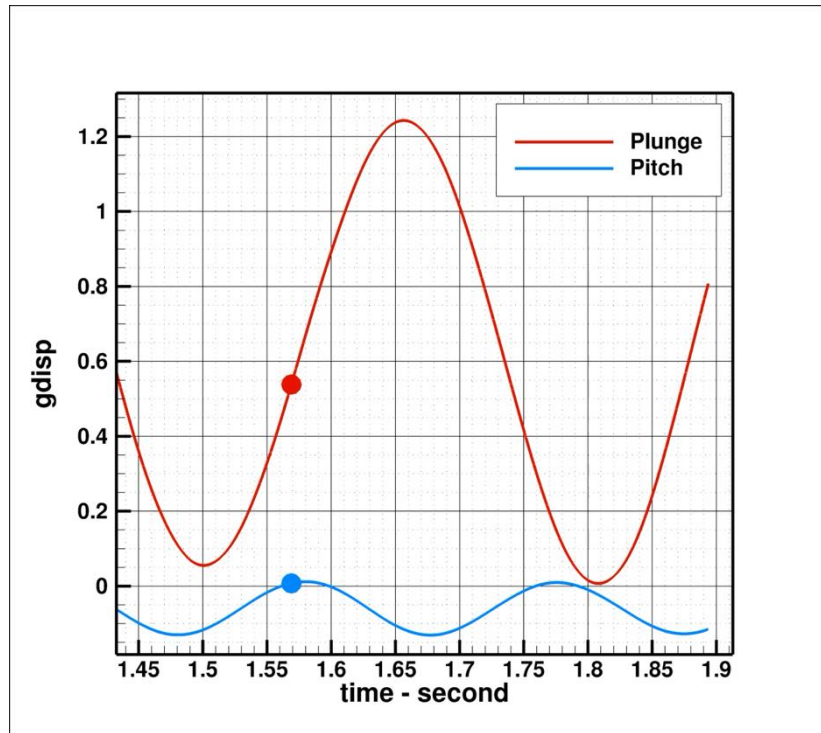
Case 1: 3D BSCW; Temporal Convergence



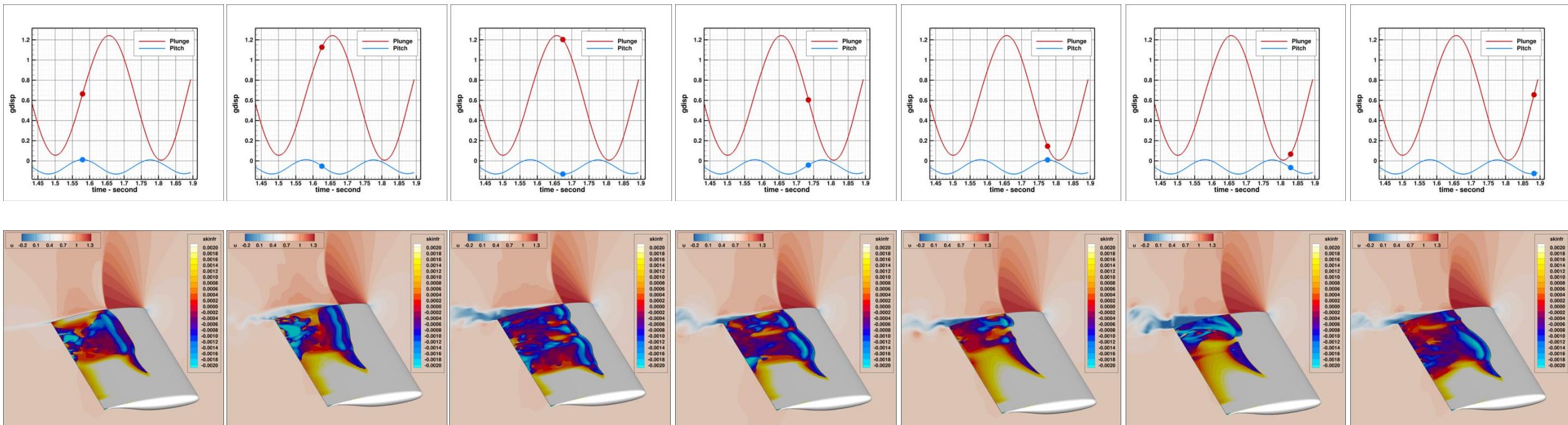
- SA turbulence model
- Roe flux difference splitting
- Venkatakrishnan flux limiter
- $\Delta t = 0.0002$ seconds, URANS
- $\Delta t = 0.00002$ seconds, URANS



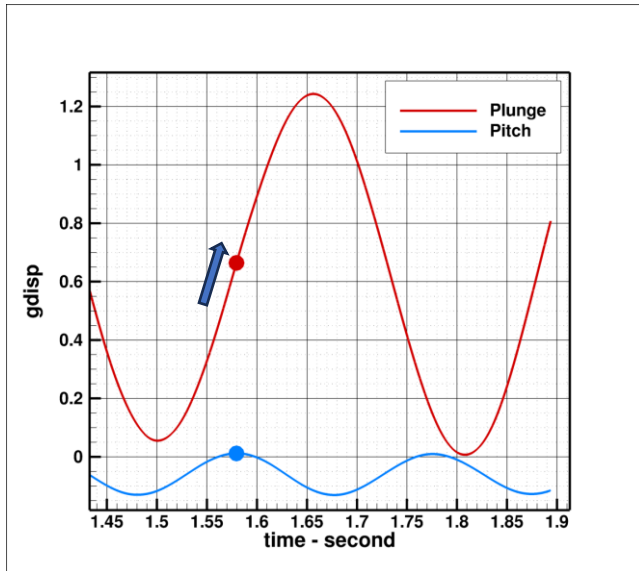
FUN3D DDES solution at Mach 0.8, 5deg AoA at Q=100 psf (near flutter), 99M mesh



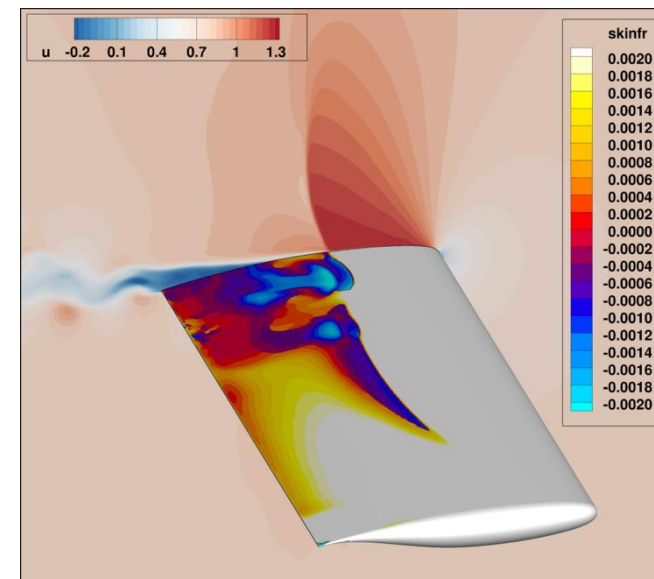
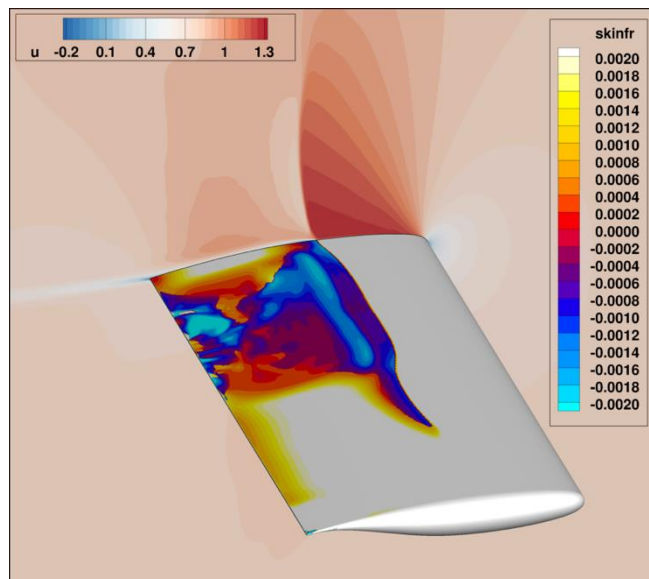
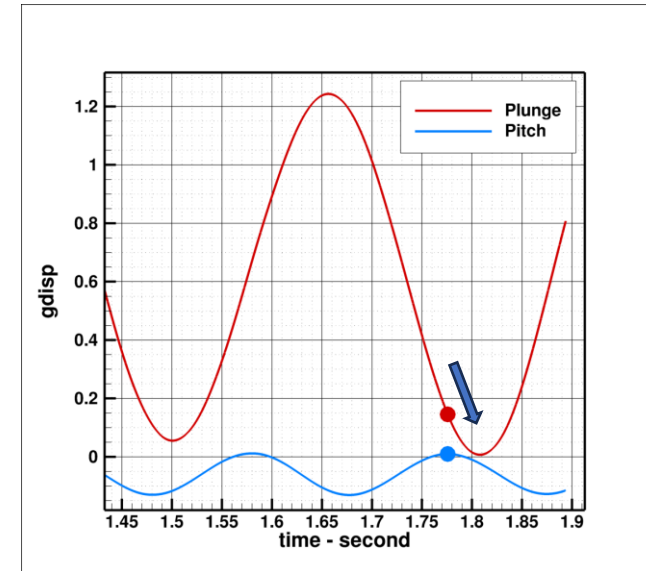
FUN3D DDES solution at Mach 0.8, 5deg AoA at Q=100 psf (near flutter), 99M mesh



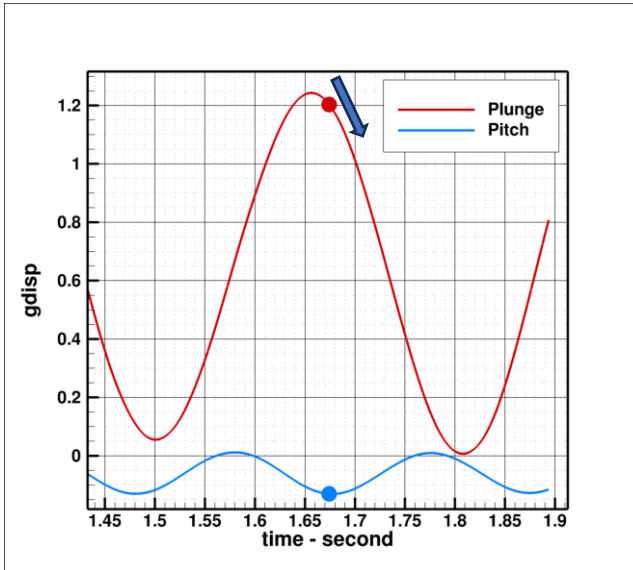
FUN3D DDES solution at Mach 0.8, 5deg AoA at $Q=100$ psf (near flutter), 99M mesh



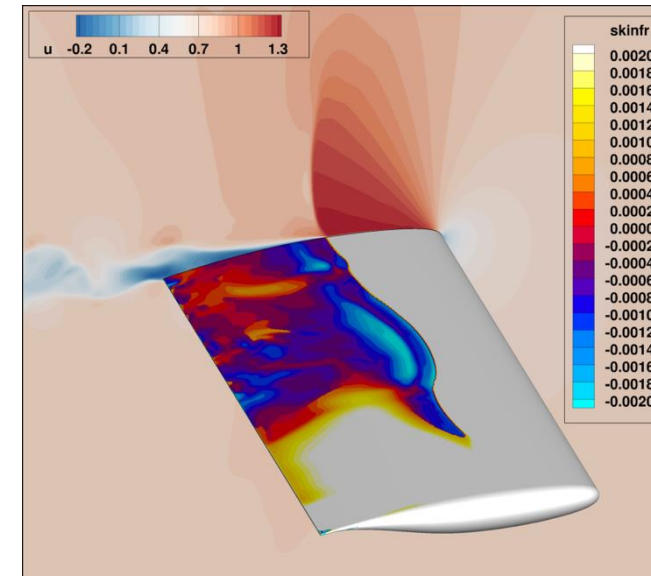
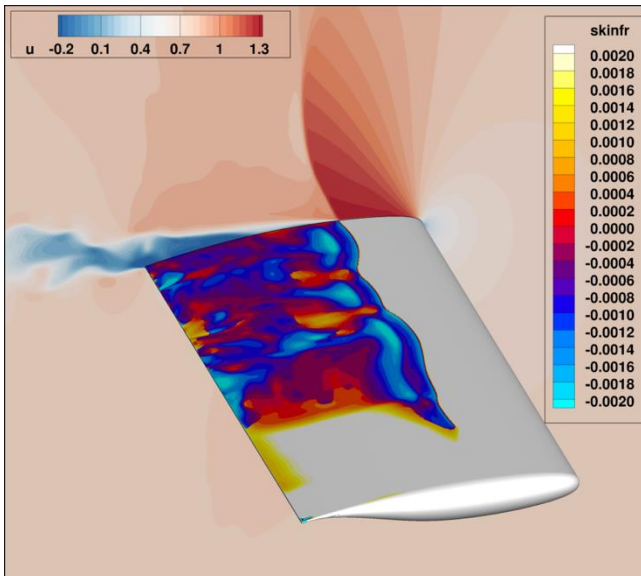
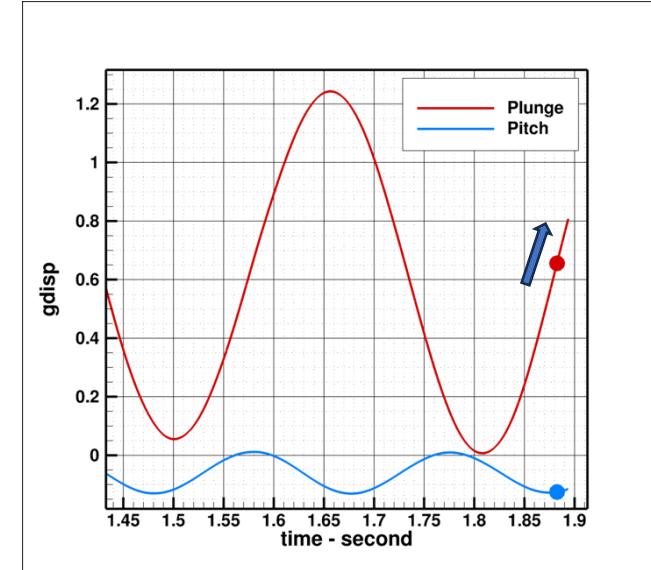
Pair of solutions:
Top of the Pitch Cycle



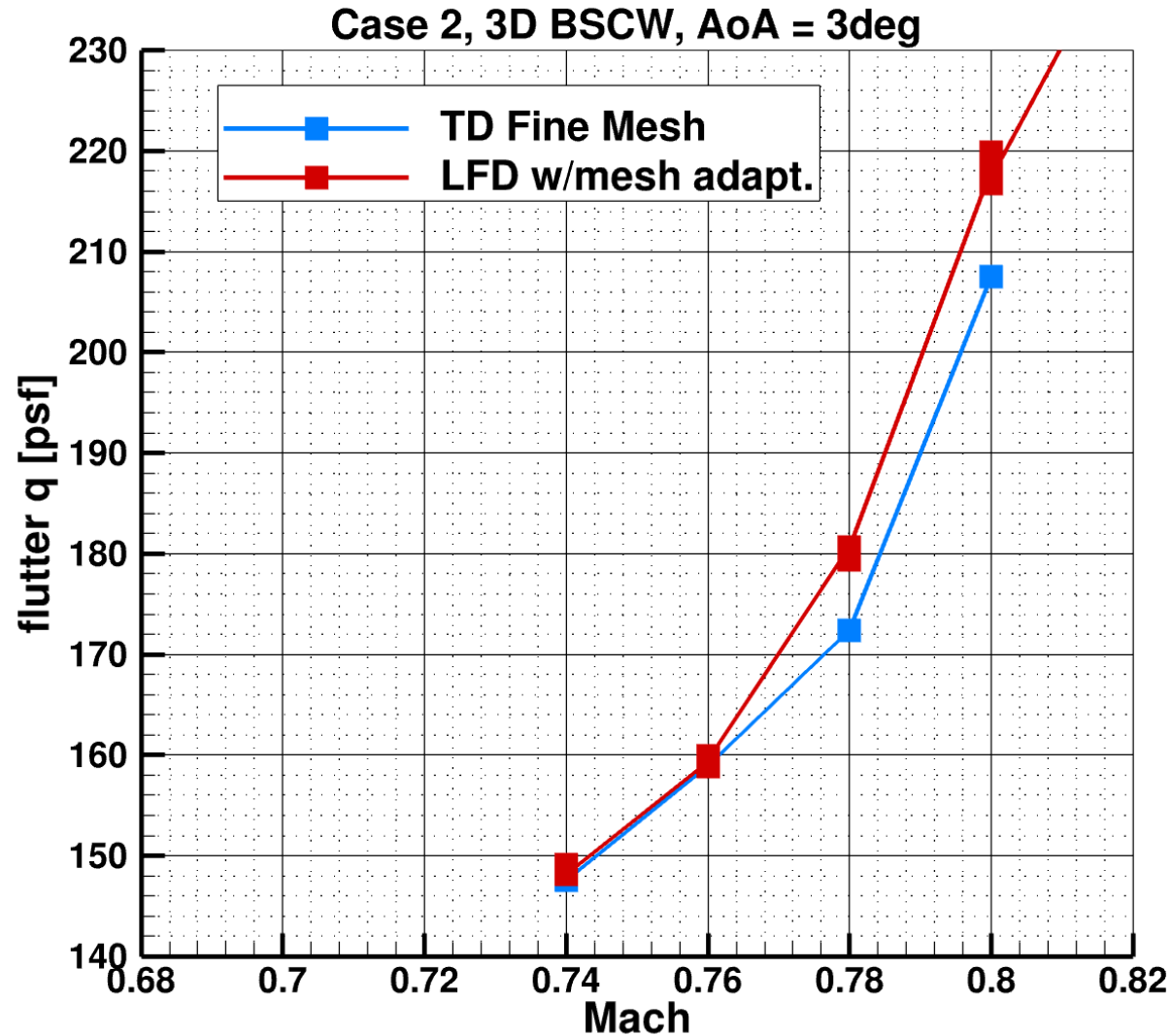
FUN3D DDES solution at Mach 0.8, 5deg AoA at Q=100 psf (near flutter), 99M mesh



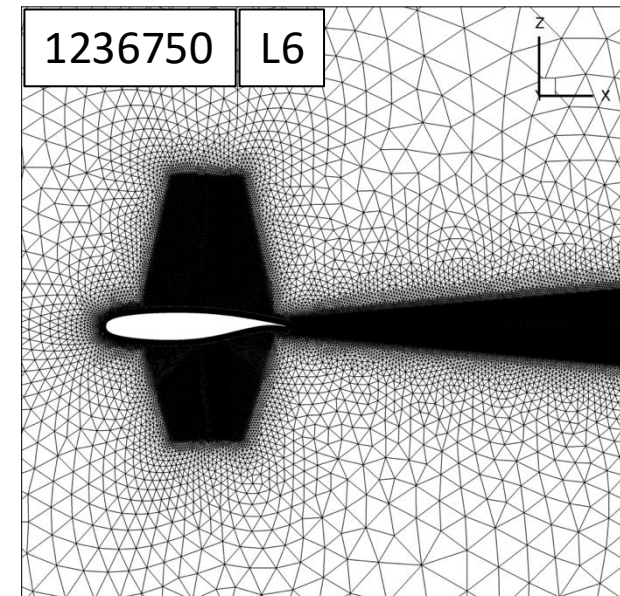
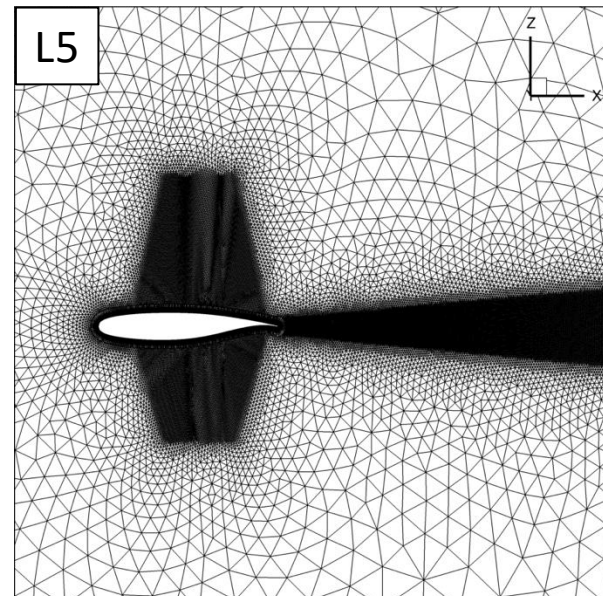
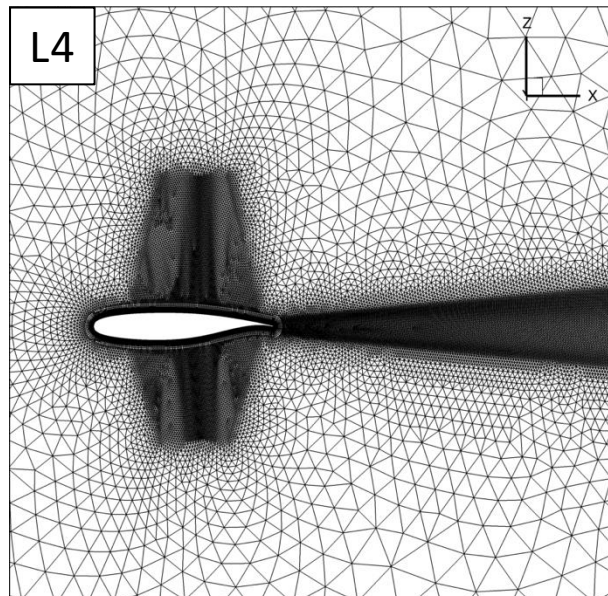
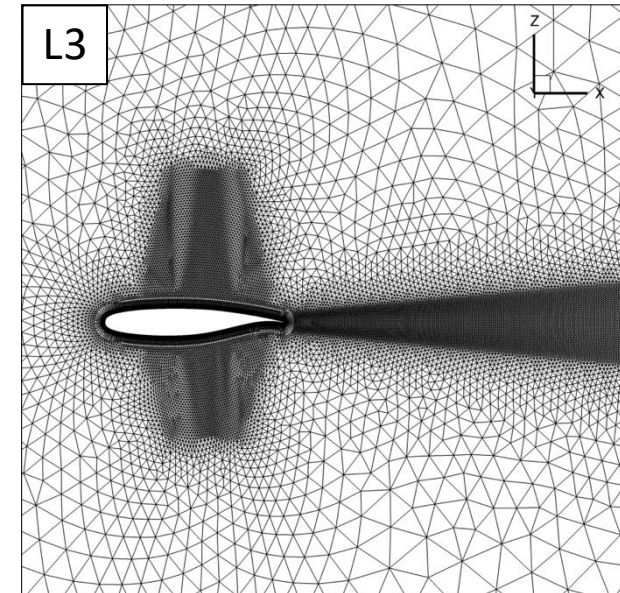
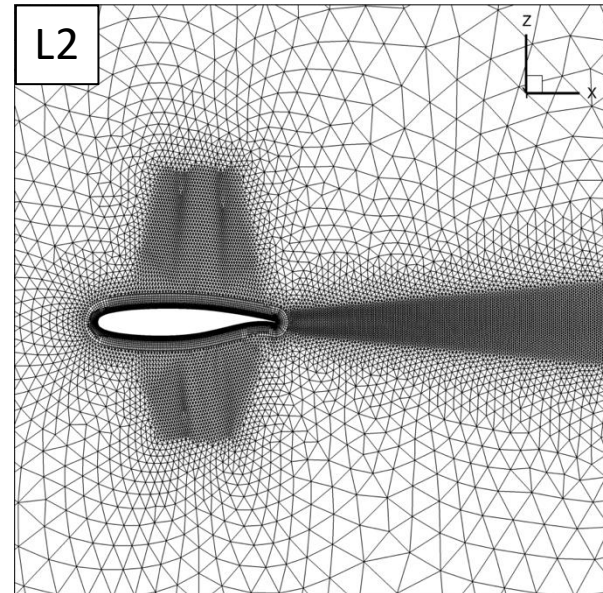
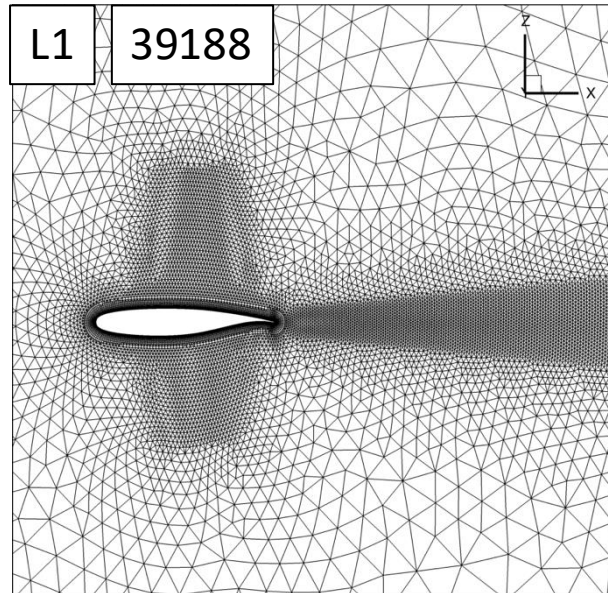
Pair of solutions:
Bottom of the Pitch Cycle



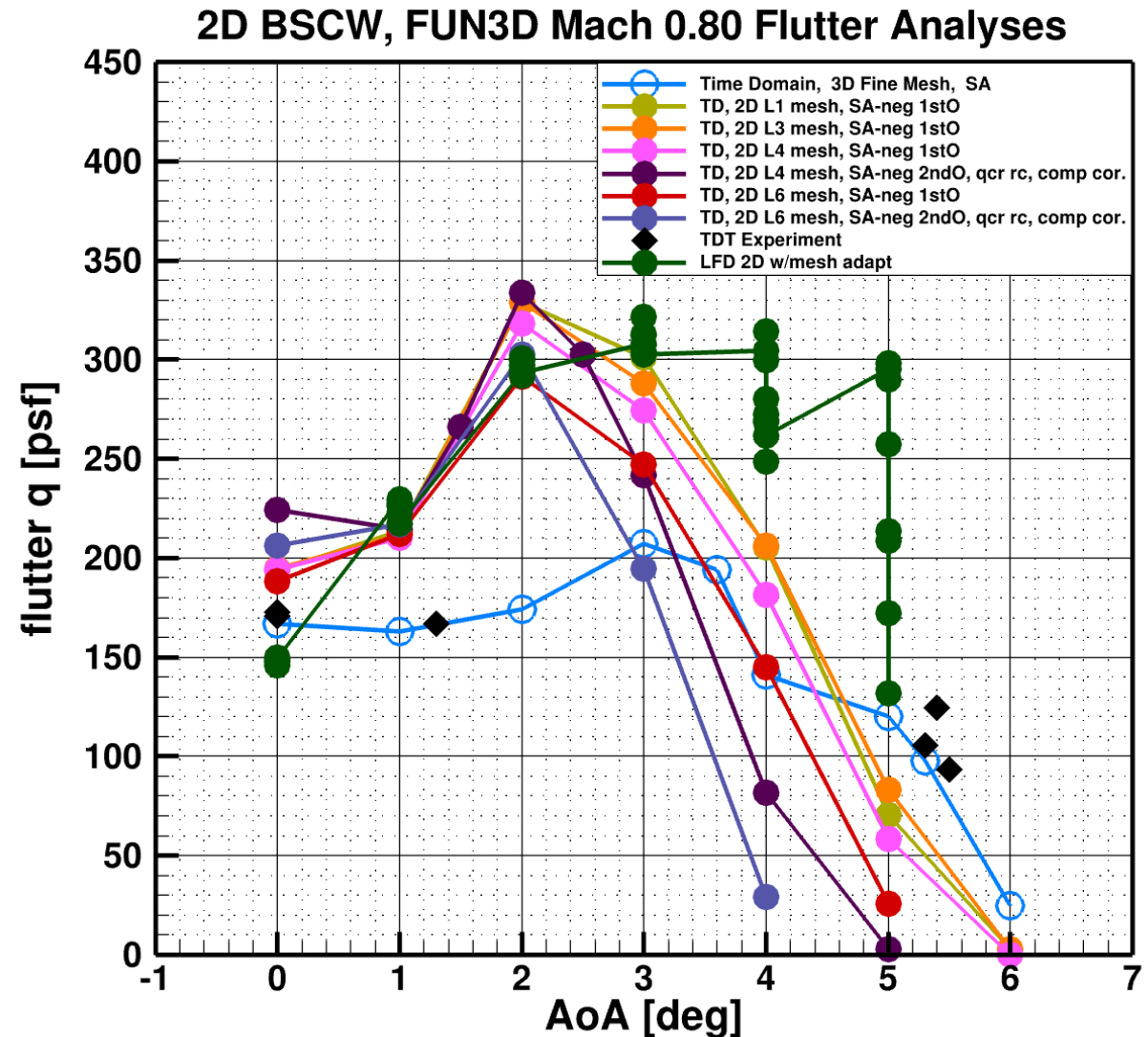
Case 2: 3D BSCW, Mach 0.74, 0.76, 0.78, 0.80



Case 3: 2D BSCW



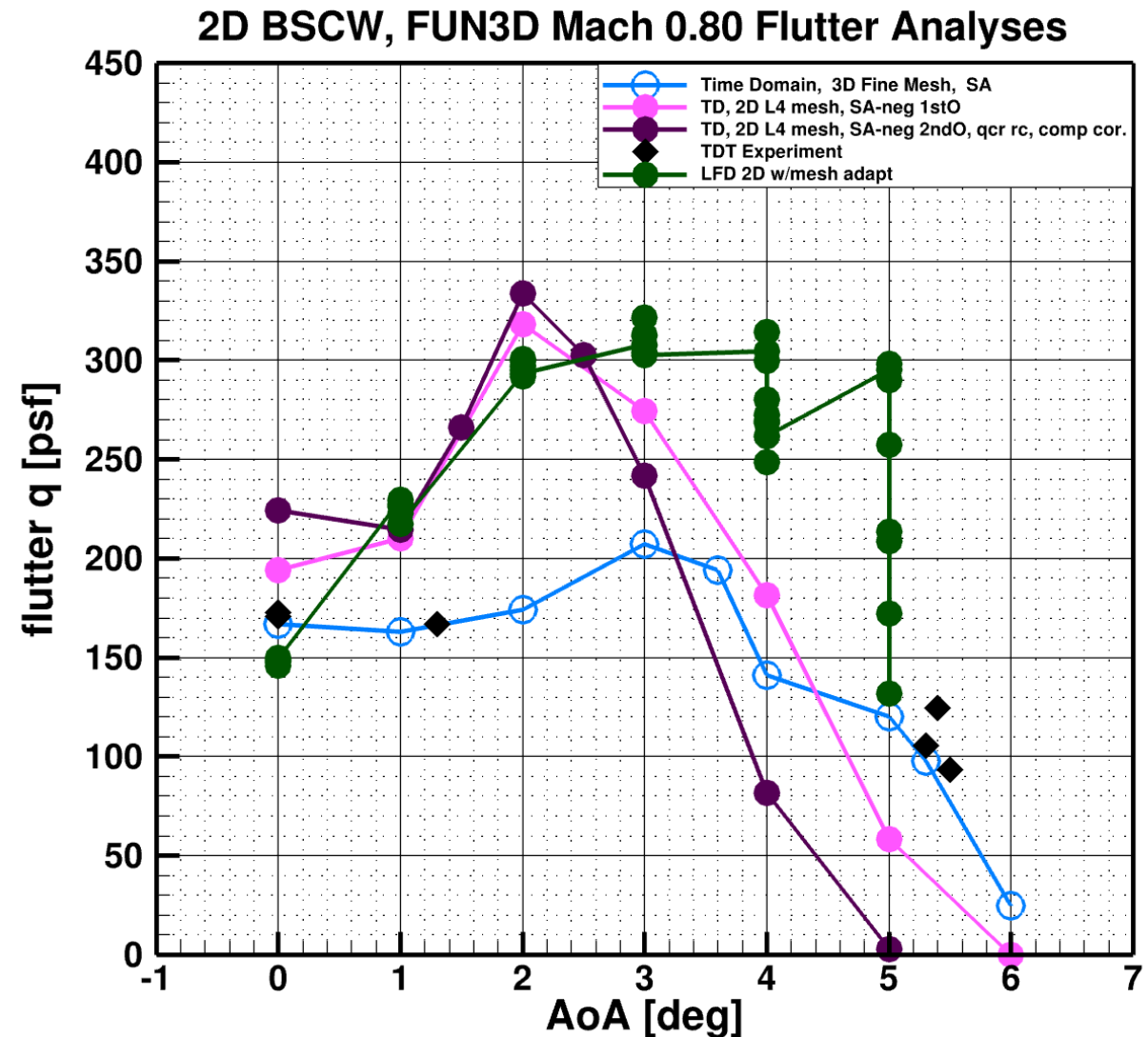
- SA-neg turbulence model, 2nd order
- Roe flux difference splitting
- Venkatakrishnan flux limiter
- $\Delta t = 0.00002$ seconds, URANS
- Compressibility Correction
- QCR2000
- Rotation/curvature correction



Case 3: 2D BSCW



- SA-neg turbulence model, 1st order
 - Roe flux difference splitting
 - Venkatakrishnan flux limiter
 - $\Delta t = 0.00002$ seconds, URANS
-
- SA-neg turbulence model, 2nd order
 - Roe flux difference splitting
 - Venkatakrishnan flux limiter
 - $\Delta t = 0.00002$ seconds, URANS
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BSCW 2D Adaptation, Mach = 0.8, AoA = 5deg



“Hand” crafted



Adapted using HeldenAdapt

