Appendix 3.7 – UNSTRUCTURED GRID GEOMETRY AND DESCRIPTION

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A3.7.1 GEOMETRY

The test geometry is a delta wing with constant thickness, sharp trailing edge and different types of leading edges (sharp leading edge, small range leading edge radius, medium range leading edge radius and long range leading edge radius). The leading edge sweep angel is 65°. At the rear end of the wing is a cylindrical sting which is mounted by a fairing to the wing surface.

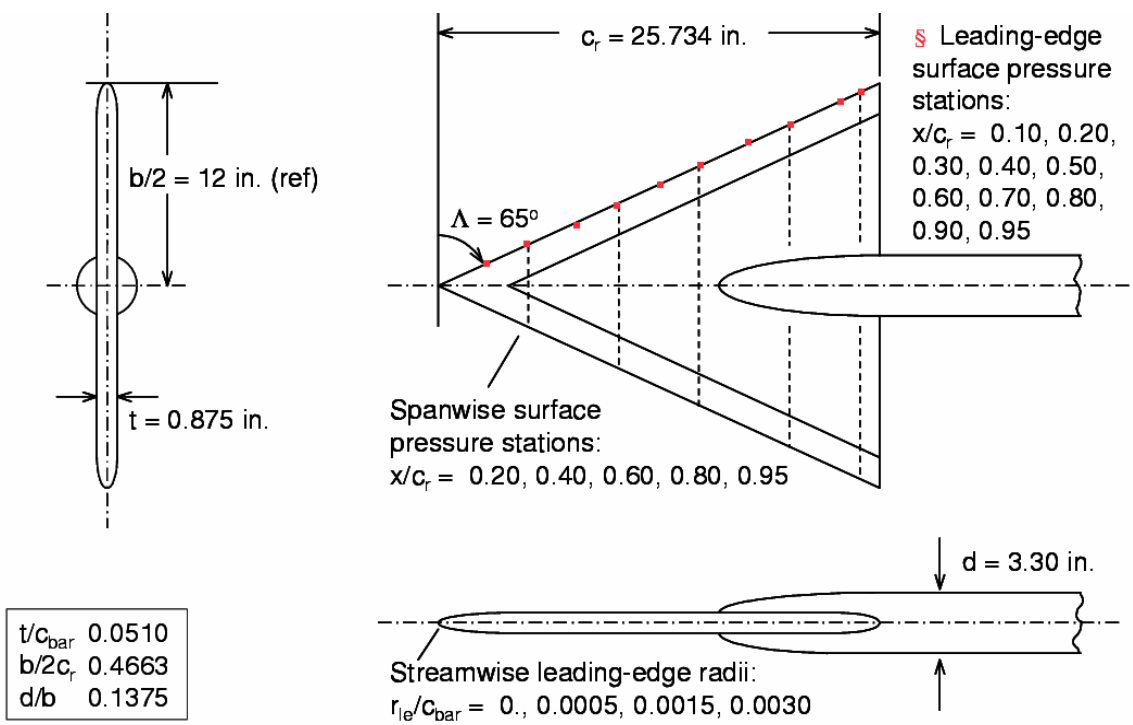

Figure A3.7-1: Geometry of VFE-2 Delta Wing.

Wing, sting-fairing and sting are analytically defined. This definition can be found in the NASA TM 465 (1996) "Julio Chu and James M. Luckring: Experimental Surface Pressure Data Obtained on 65° Delta Wing Across Reynolds Number and Mach Number Ranges, Volume 3: Medium Range Leading Edge". This report can be found on the NASA-LaRC techreports server http://techreports.larc.nasa.gov/ltrs/html available. To get the report and other publications concerning this delta wing type, take a lock into the search-letters "Luckring Delta Wing".

A3.7.2 DLR TAU-CODE AND COBALT GRID GENERATION DESCRIPTION

The difference between the computational grid for the DLR TAU-Code and Cobalt is the number of prism layers in the Cobalt grid to resolve the flow in the boundary layer and the resolution in the field, compare Figure A3.7-2 and Figure A3.7-3 with Figure A3.7-5 and Figure A3.7-6. For the cell centered code Cobalt the grid is sufficient with a coarser distribution than necessary for the cell vertex code TAU.

Table A3.7-1: Computational Grid Parameters

Code	Points	Elements	Prism Layers	First Spacing
DLR TAU-Code	12.8×10^6	51×10^6	20	0.005
Cobalt	6.1×10^6	26×10^6	15	0.005

Both grids are pre-refined grids with an initial value of 0.5 mm at the leading edge for the surface cells and tetrahedras. The influence radius for this leading edge source is 3 mm. The field is refined with tetrahedrons of 3mm for the Cobalt and 2mm for the TAU grid respectively, see Figure A3.7-4.

The grid surface topology is located under \TR-AVT-113-Appendix-3.7-Files\$TR-AVT-113-APPENDIX 3-7-Download-IGES-File.iges.

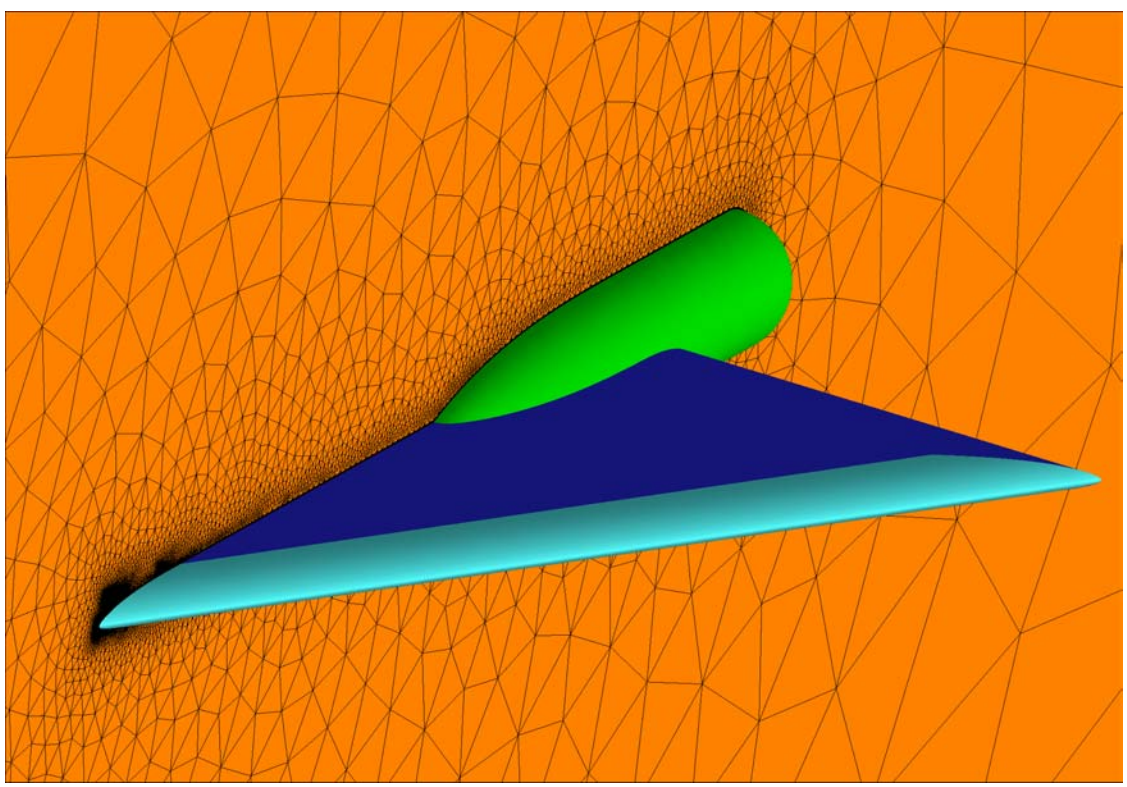

Figure A3.7-2: TAU Grid – Surface Topology and Discretization of the Symmetry Plane.

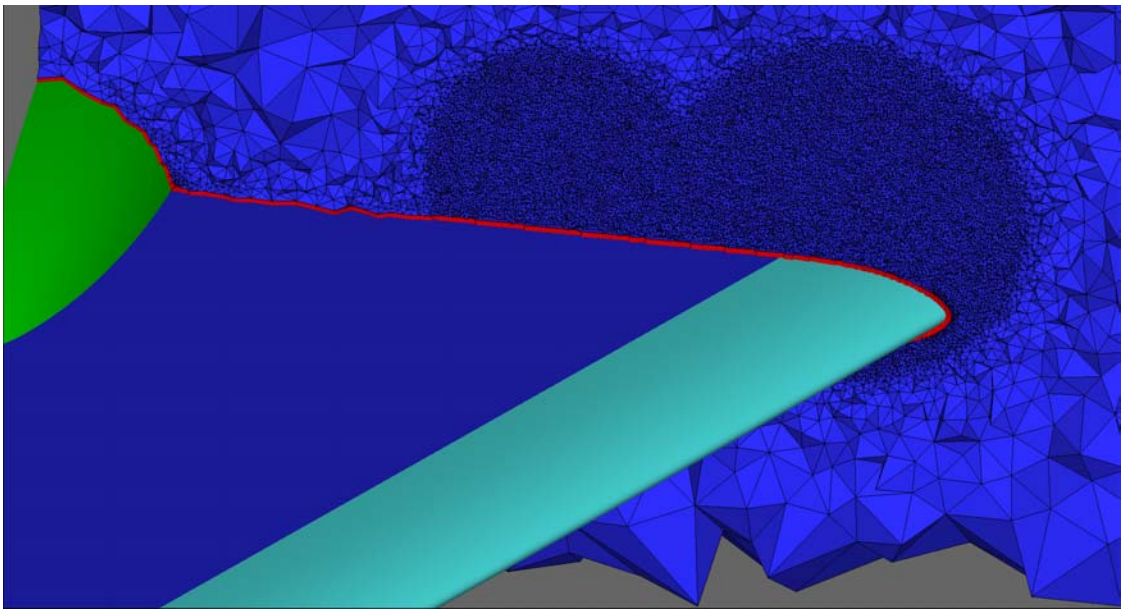

Figure A3.7-3: TAU Grid – Prism Layer and Pre-Refined Tetrahedral Grid at 80% Chord Length.

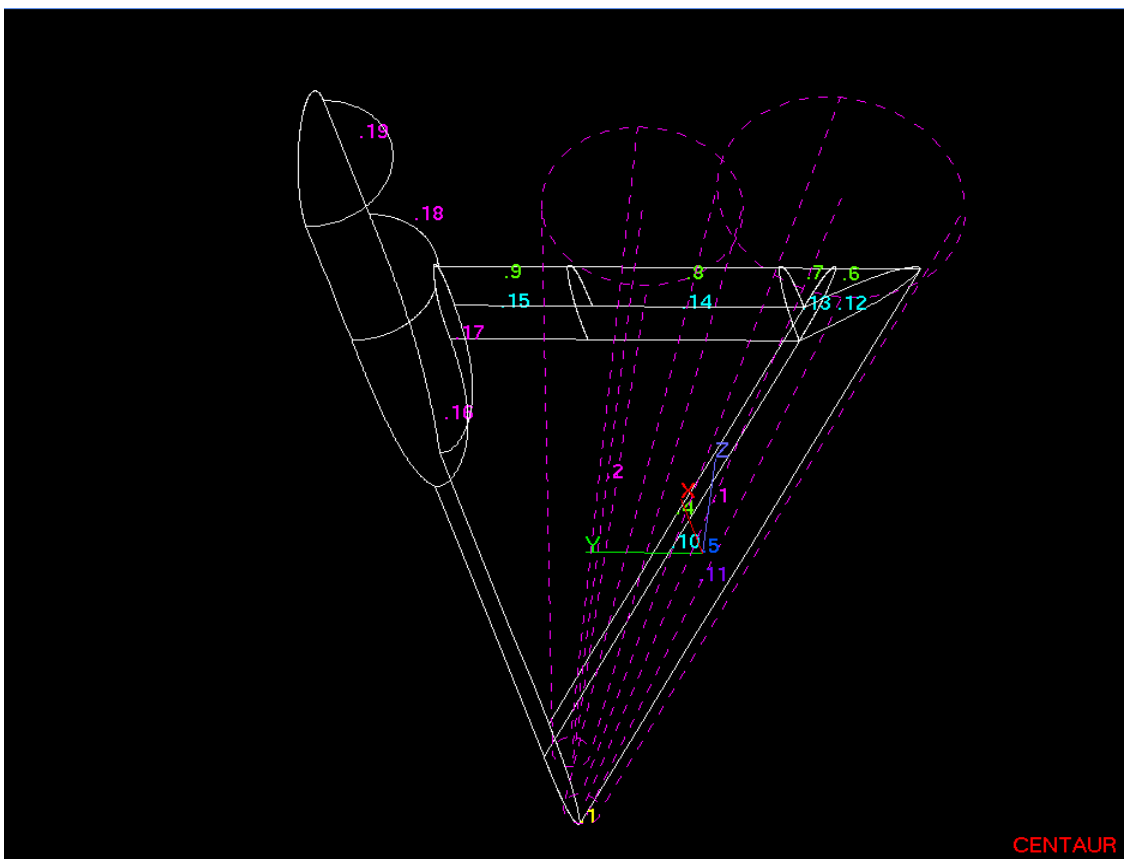

Figure A3.7-4: Source Topology for the Tetrahedral Field Sources.

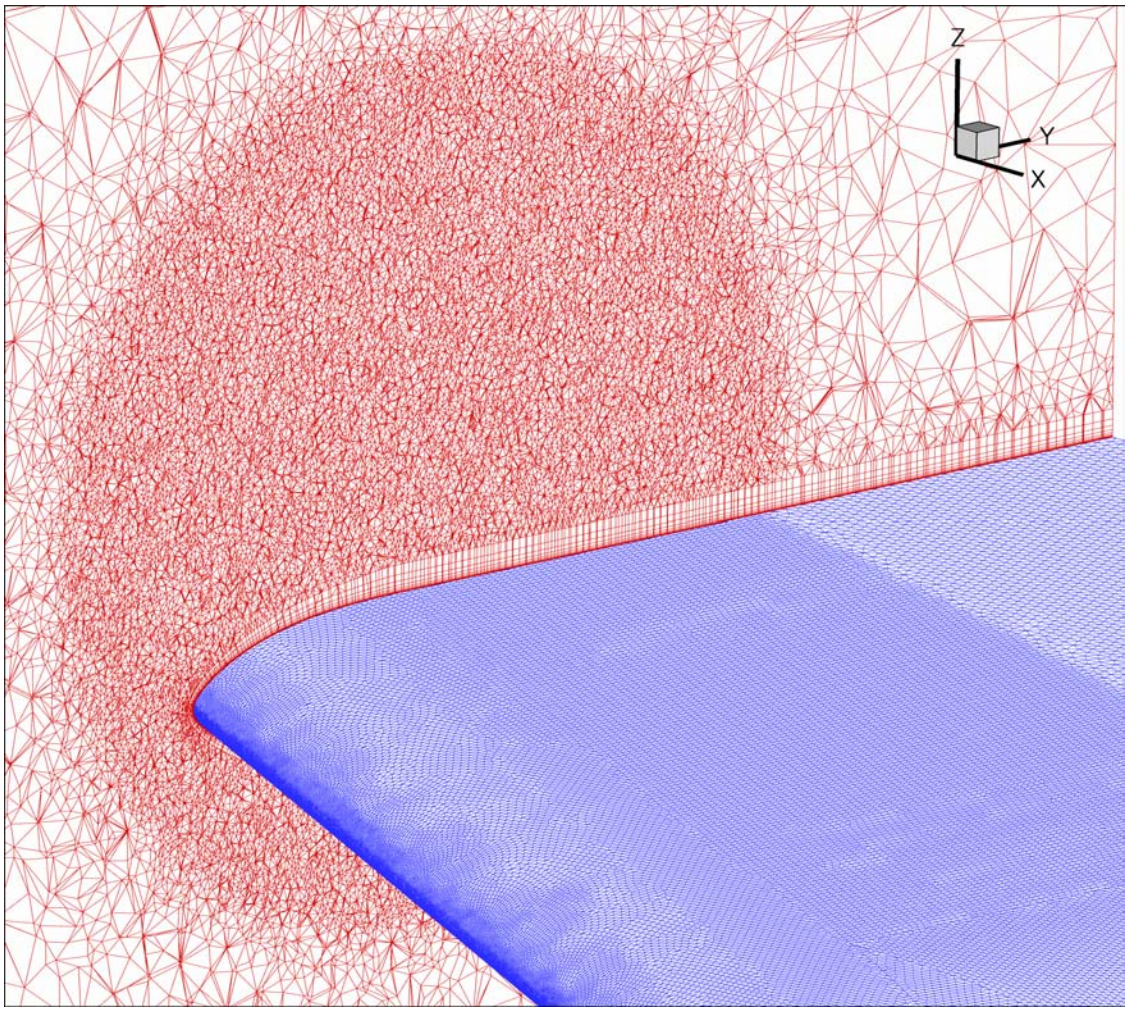

Figure A3.7-5: Cobalt Grid – Prism Layer and Pre-Refined Tetrahedral Grid.

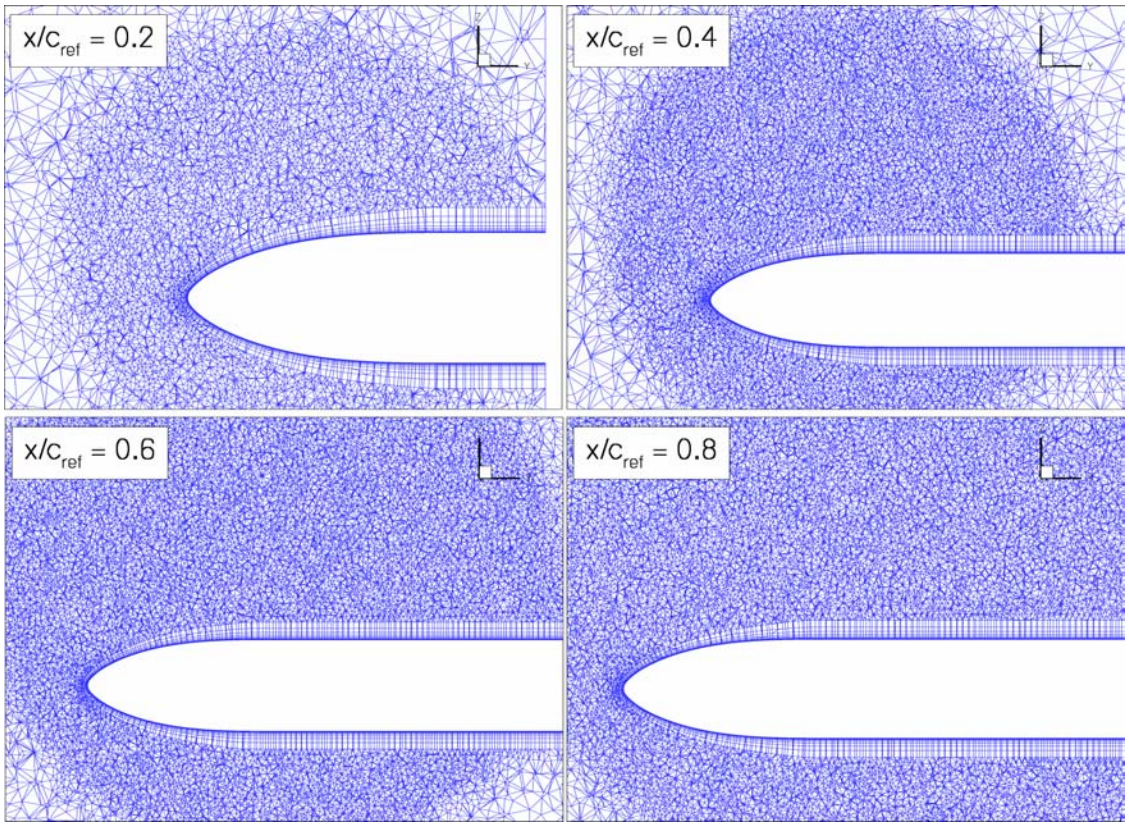

Figure A3.7-6: Cobalt Grid – Prism Layer and Pre-Refined Tetrahedrals.