Ansys Fluent Simulation Report-NACA0012-0

Analyst	Deep
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Table of Contents

System Information

Application	Fluent
Settings	2d, double precision, pressure-based, SST k-omega
Version	25.1.0-10211
Source Revision	1830ea10b4
Build Time	Jan 9 2025 12:45:58 EST
CPU	Intel(R) Core(TM) i7-14650HX
OS	Windows

Geometry and Mesh

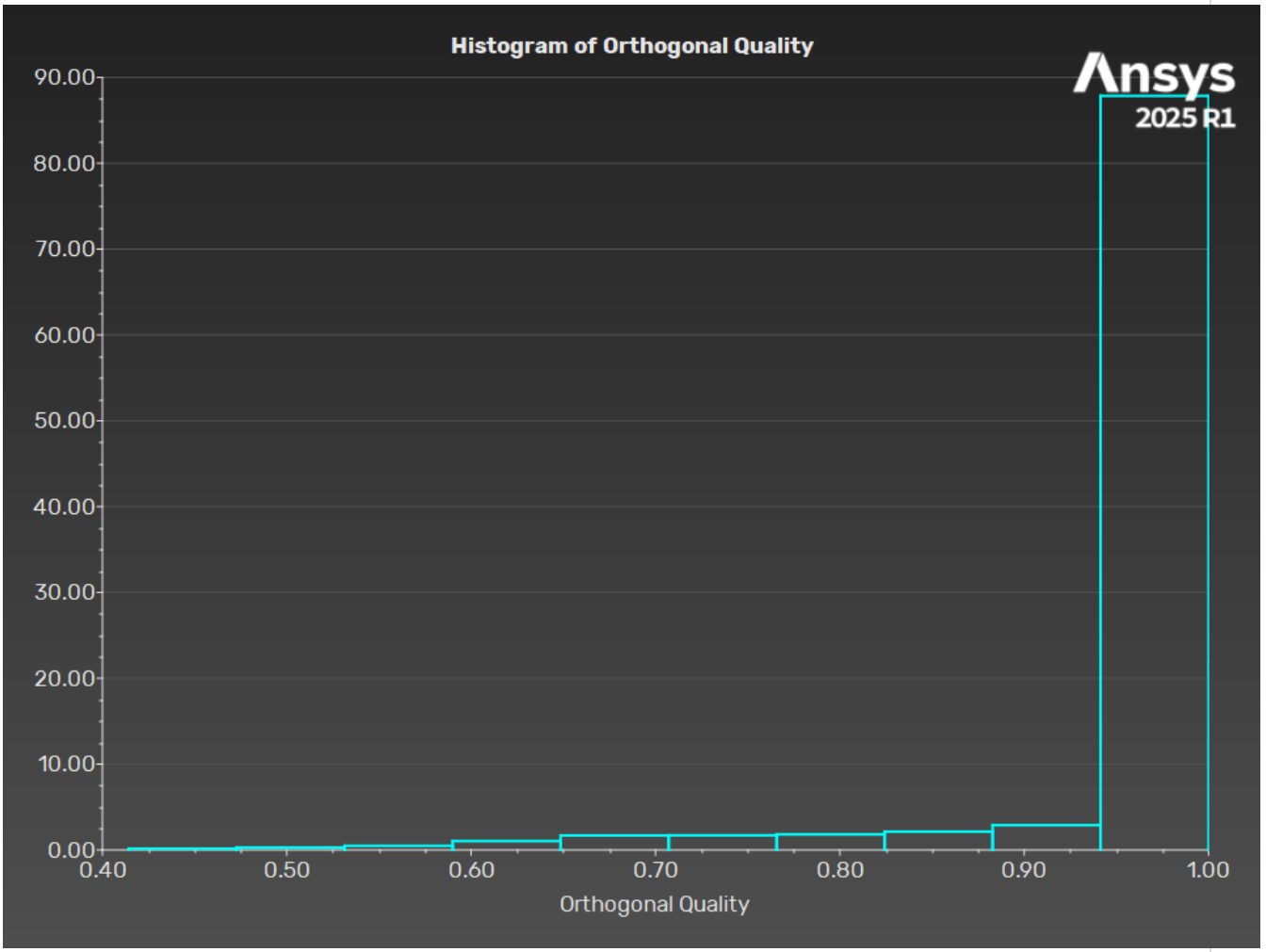
Mesh Size

Cells	Faces	Nodes
525000	1051550	526550

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
solid-surface_body	Quad Cell	0.41427239	55890.043

Orthogonal Quality



Simulation Setup

Physics

Models

Model	Settings
Space	2D
Time	Steady
Viscous	SST k-omega turbulence model

Material Properties

— Fluid	
— air	
Density	1.204 kg/m^3
Viscosity	1.813e-05 kg/(m s)
— Solid	
— aluminum	
Density	2719 kg/m^3

Cell Zone Conditions

— Fluid	
— solid-surface_body	
Material Name	air
Specify source terms?	no
Specify fixed values?	no
Frame Motion?	no
Laminar zone?	no
Porous zone?	no

Boundary Conditions

— Inlet	
— inlet	
Velocity Specification Method	Magnitude and Direction

Reference Frame	Absolute
Velocity Magnitude [m/s]	25
Supersonic/Initial Gauge Pressure [Pa]	0
Component of Flow Direction (x,y)	(1, 0)
Turbulence Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
━ Outlet	
━ outlet	
Backflow Reference Frame	Absolute
Gauge Pressure [Pa]	0
Pressure Profile Multiplier	1
Backflow Direction Specification Method	Normal to Boundary
Turbulence Specification Method	Intensity and Viscosity Ratio
Backflow Turbulent Intensity [%]	5
Backflow Turbulent Viscosity Ratio	10
Backflow Pressure Specification	Total Pressure
Build artificial walls to prevent reverse flow?	no
Average Pressure Specification?	no
Specify targeted mass flow rate	no
━ Wall	
━ airfoil	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	Standard
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5

Reference Values

Area	1 m^2
Density	1.204 kg/m^3
Depth	1 m
Enthalpy	0 J/kg
Length	1 m
Pressure	0 Pa
Temperature	293.16 K
Velocity	25 m/s

Viscosity	1.813e-05 kg/(m s)
Ratio of Specific Heats	1.4
Yplus for Heat Tran. Coef.	300
Reference Zone	solid-surface_body

Solver Settings

− Equations	
Flow	True
Turbulence	True
− Numerics	
Absolute Velocity Formulation	True
− Under-Relaxation Factors	
Density	1
Body Forces	1
Turbulent Kinetic Energy	0.8
Specific Dissipation Rate	0.8
Turbulent Viscosity	1
Explicit Momentum	0.5
Explicit Pressure	0.5
− Pressure-Velocity Coupling	
Type	Coupled
Flow Courant Number	200
− Discretization Scheme	
Pressure	Second Order
Momentum	Second Order Upwind
Turbulent Kinetic Energy	Second Order Upwind
Specific Dissipation Rate	Second Order Upwind
− Solution Limits	
Minimum Absolute Pressure [Pa]	1
Maximum Absolute Pressure [Pa]	5e+10
Minimum Static Temperature [K]	1
Maximum Static Temperature [K]	5000
Minimum Turb. Kinetic Energy [m^2/s^2]	1e-14
Minimum Spec. Dissipation Rate [s^-1]	1e-20
Maximum Turb. Viscosity Ratio	100000

Run Information

Number of Machines	1
Number of Cores	8
Case Read	14.358 seconds
Iteration	935.992 seconds
AMG	701.188 seconds
Virtual Current Memory	0.540775 GB
Virtual Peak Memory	2.74049 GB
Memory Per M Cell	0.987825

Solution Status

Iterations: 100

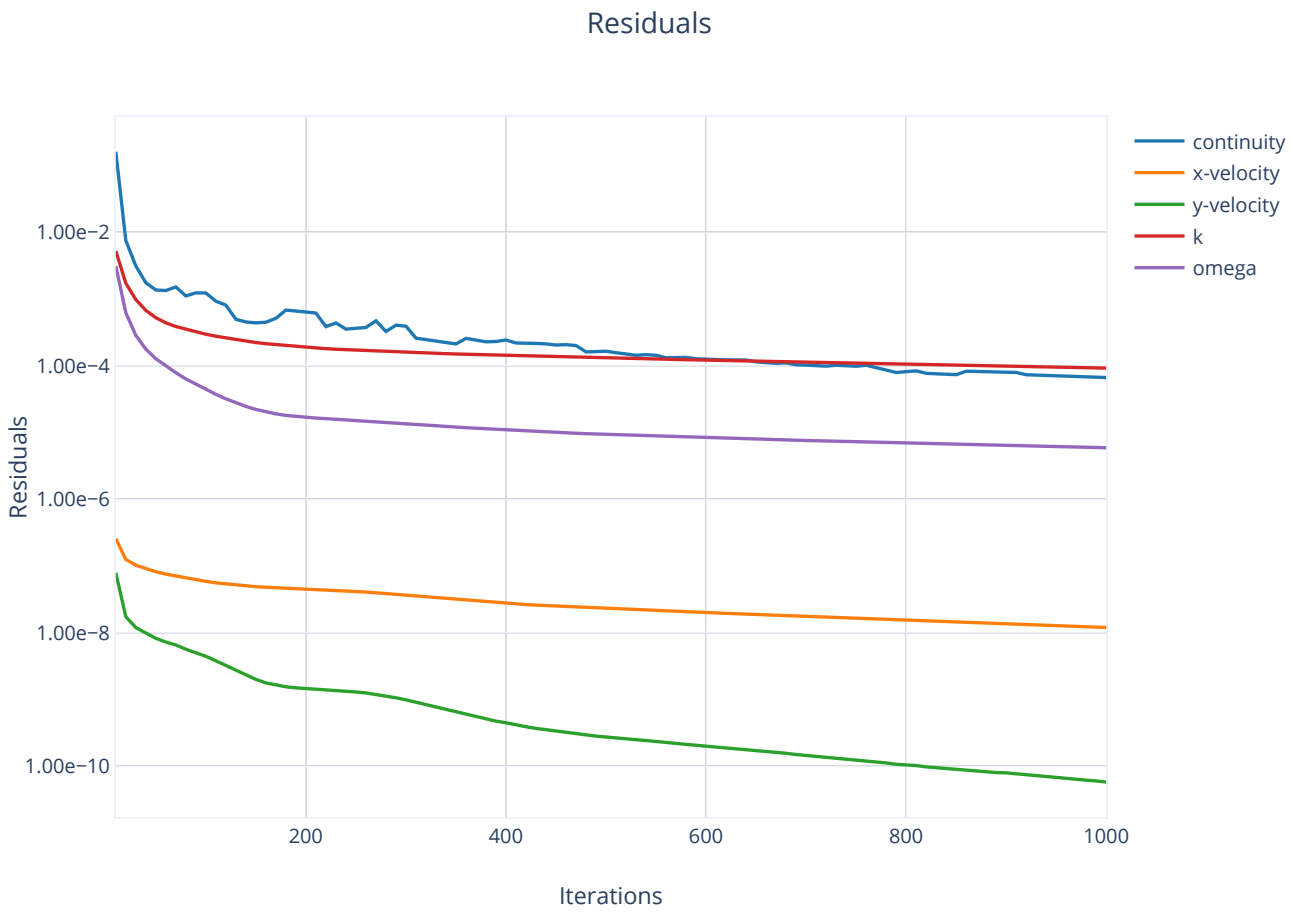
	Value	**Absolute Criteria**	**Convergence Status**
continuity	6.627882e-05	1e-07	Not Converged
x-velocity	1.19634e-08	0.001	Converged
y-velocity	5.799004e-11	0.001	Converged
k	9.181352e-05	0.001	Converged
omega	5.88914e-06	0.001	Converged

Report Definitions

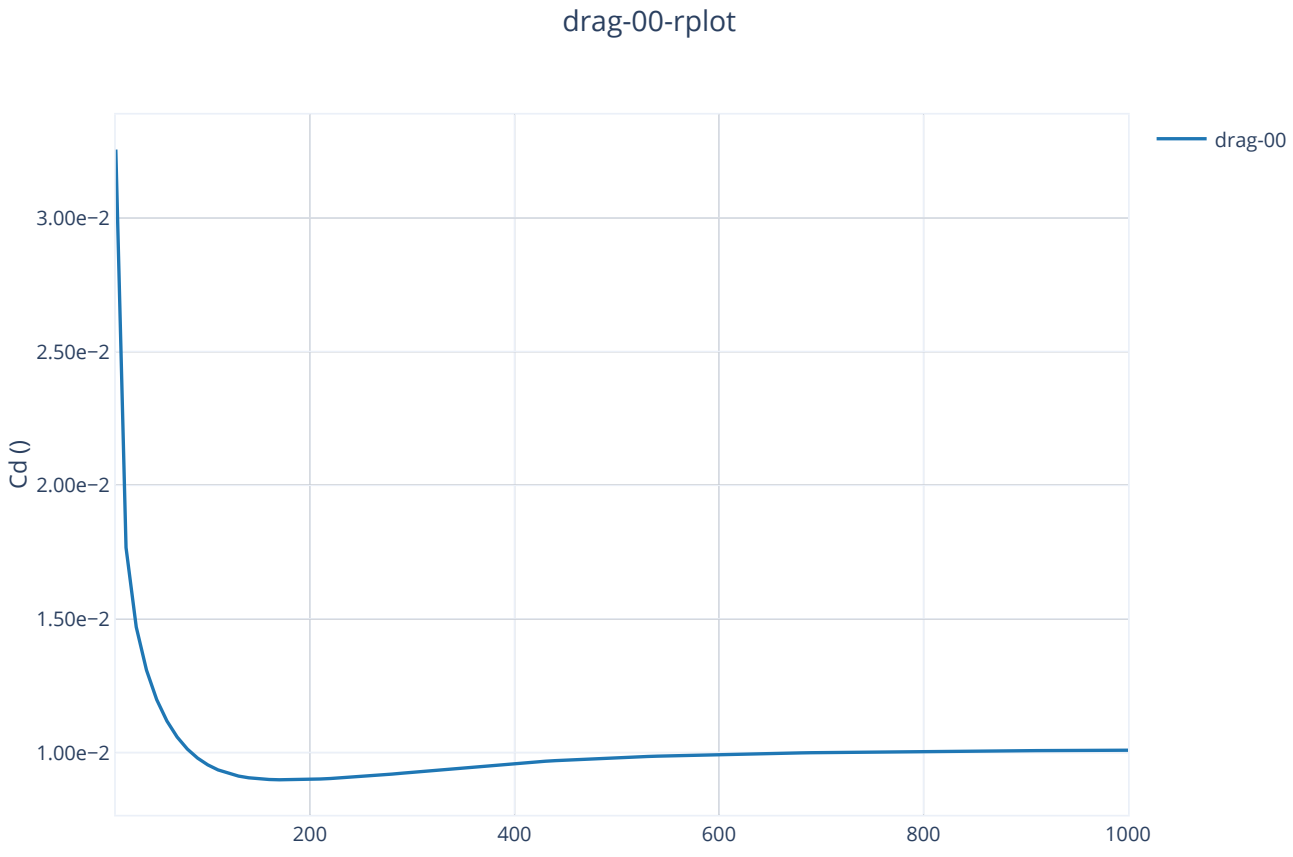
lift-00	-6.53946e-07
drag-00	0.01008656

Plots

Residuals

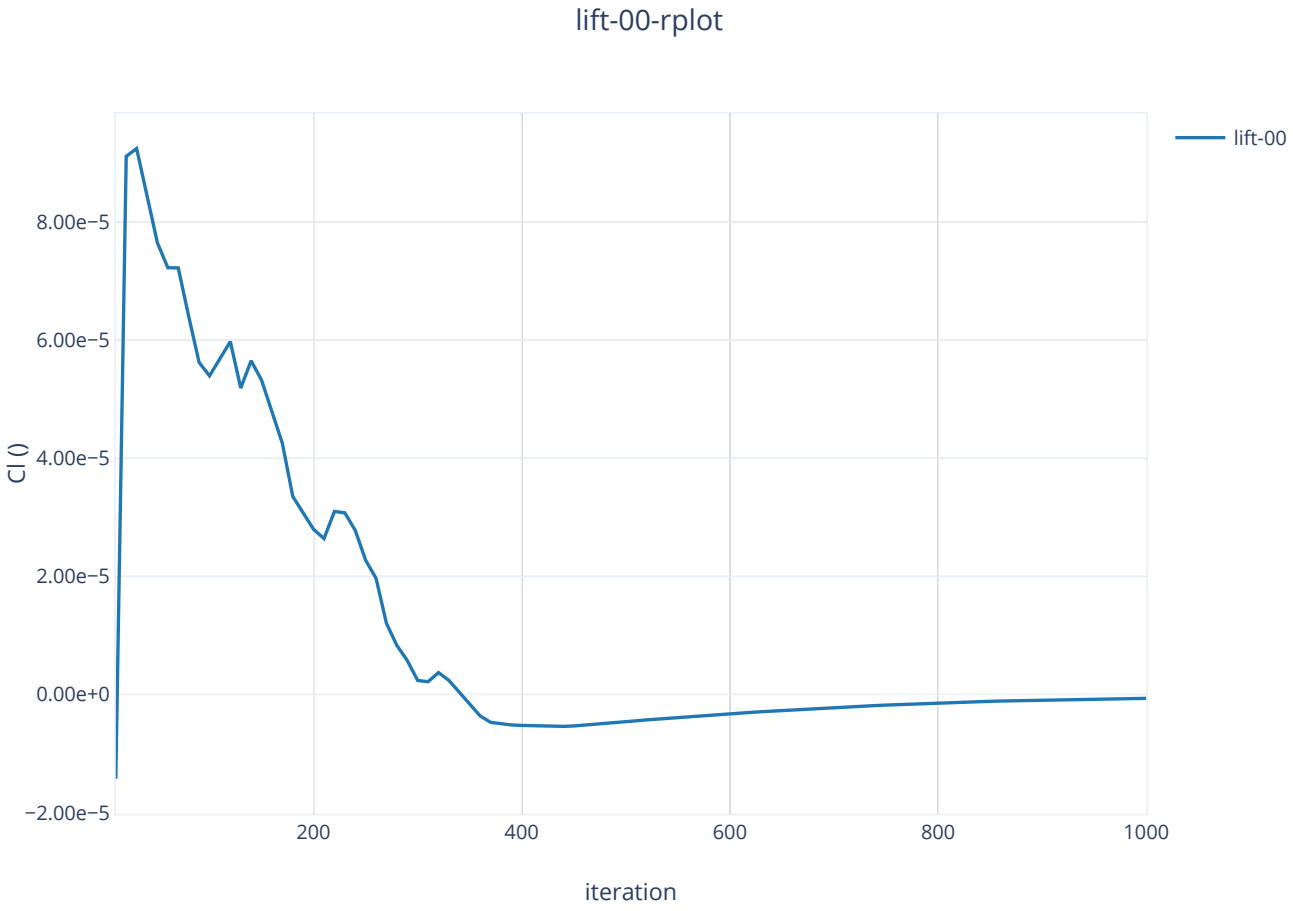


drag-00-rplot



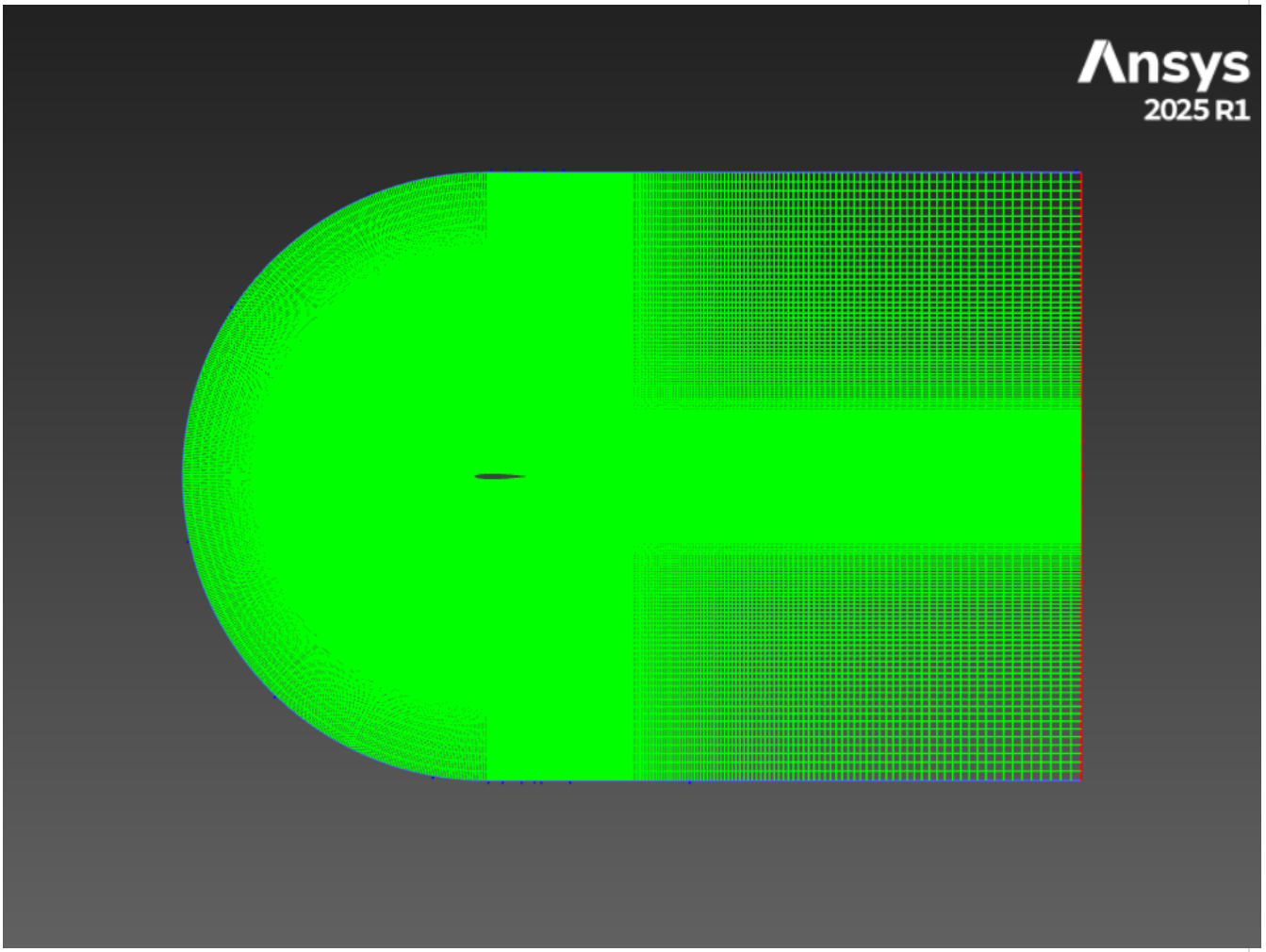
iteration

lift-00-rplot



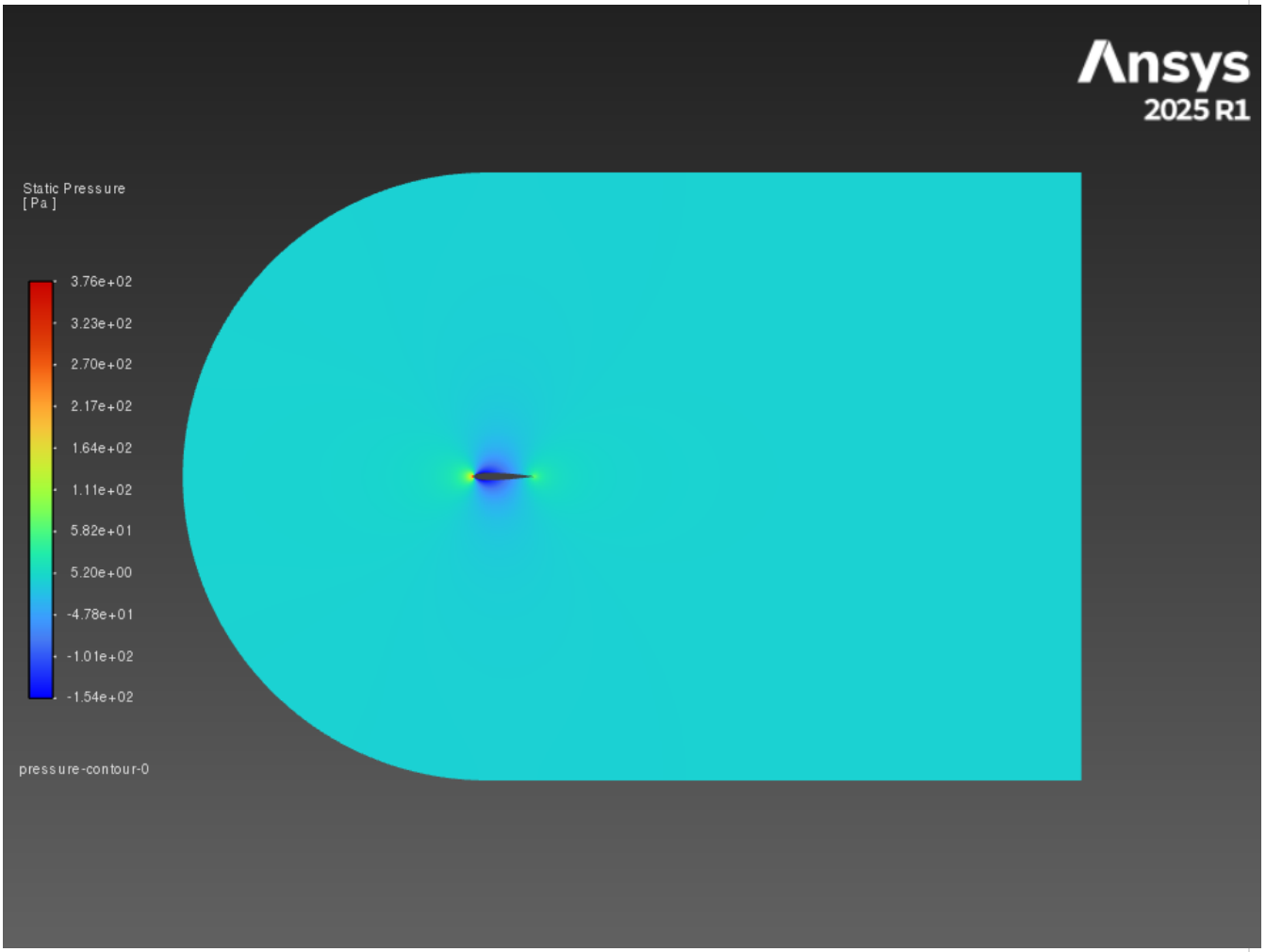
Mesh

mesh-1

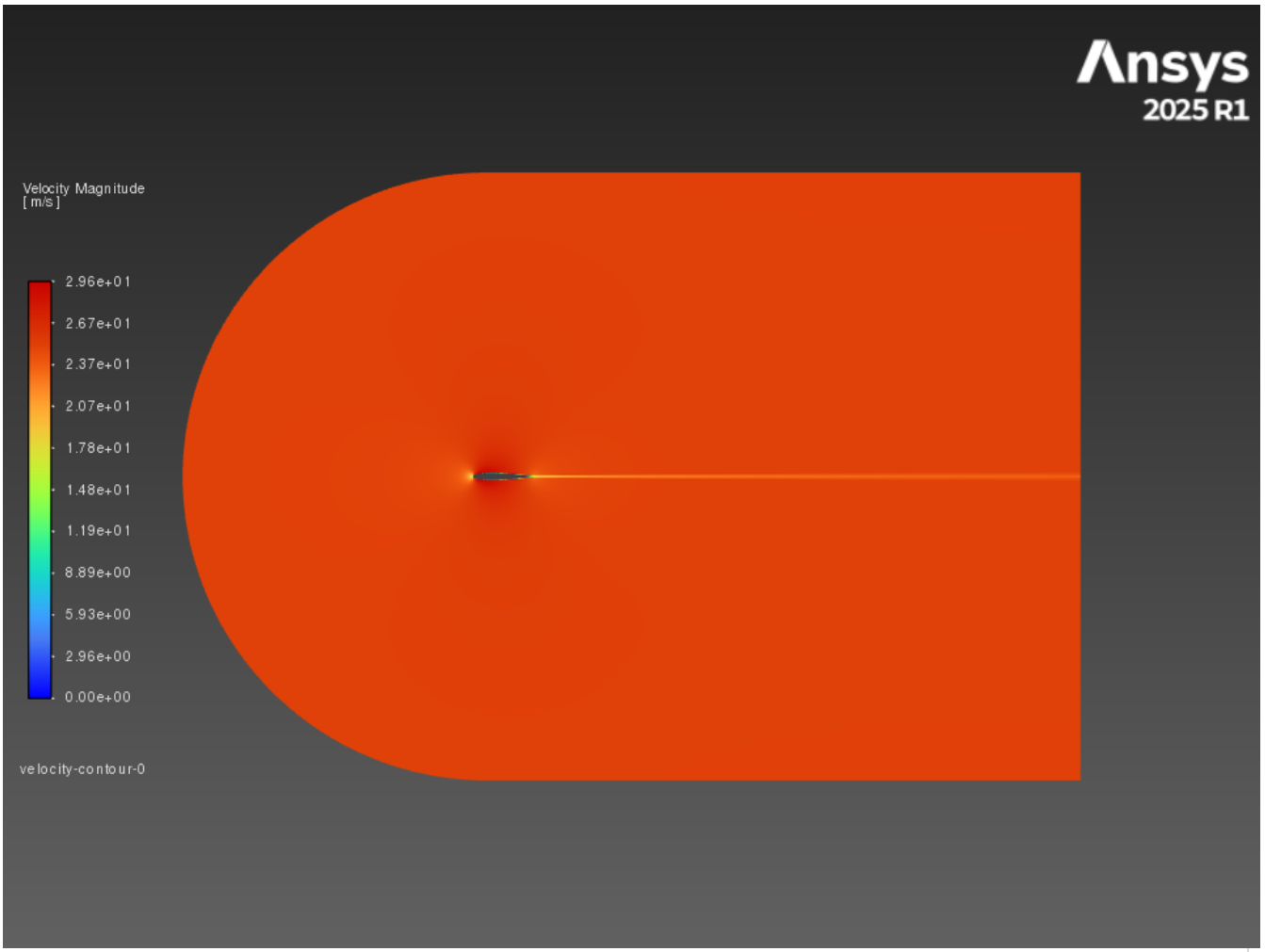


Contours

pressure-contour-0



velocity-contour-0


Ansys
2025 R1
Velocity Magnitude
[m/s]
2.96e+01
2.67e+01
2.37e+01
2.07e+01
1.78e+01
1.48e+01
1.19e+01
8.89e+00
5.93e+00
2.96e+00
0.00e+00
velocity-contour-0