Ansys Fluent Simulation Report-NACA-0012-5

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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

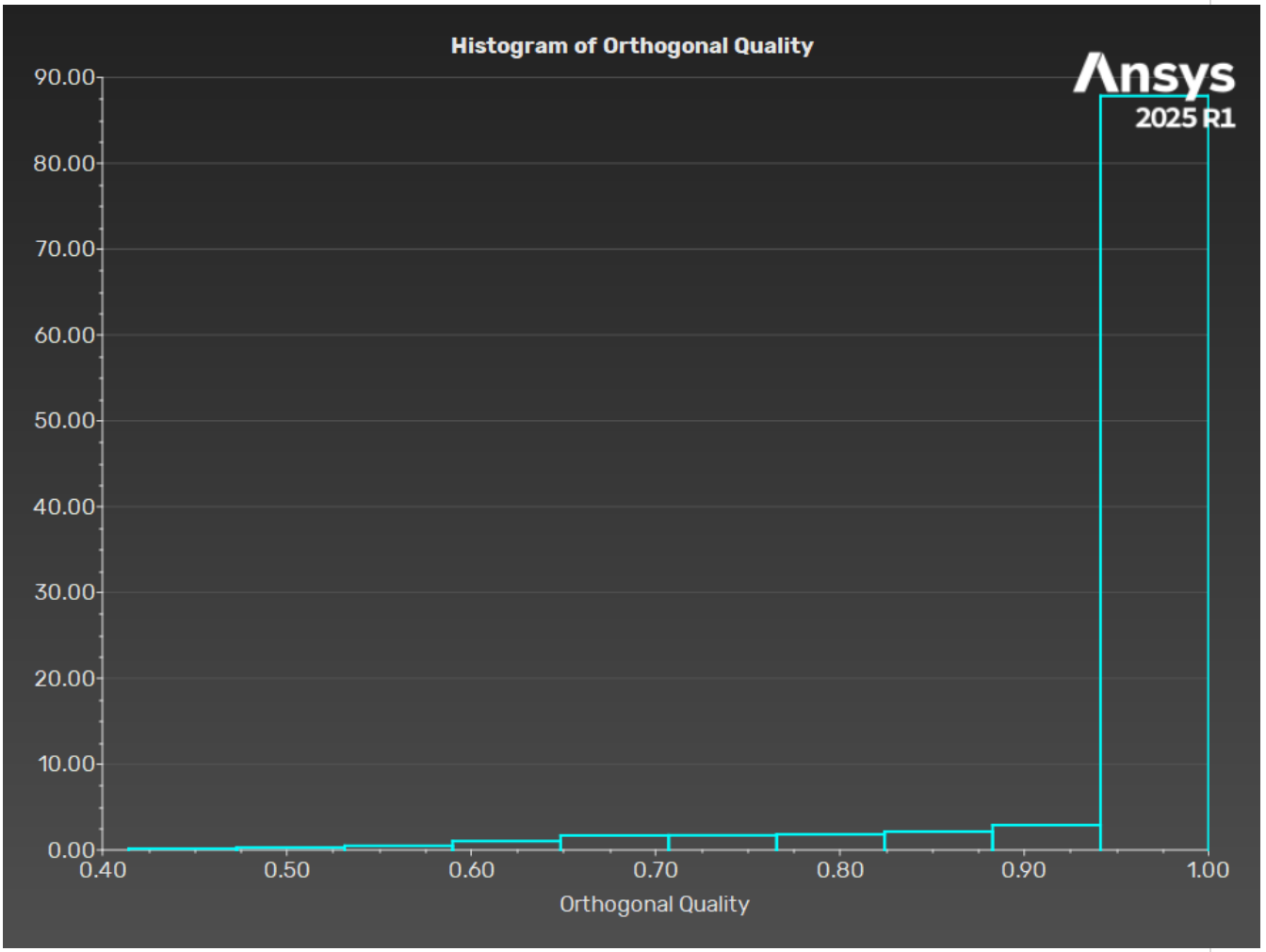
Mesh Size

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)	(0.9961947, 0.08715574)
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	15.093 seconds
Iteration	800.807 seconds
AMG	566.564 seconds
Virtual Current Memory	0.765751 GB
Virtual Peak Memory	3.02597 GB
Memory Per M Cell	1.36647

Solution Status

Iterations: 100

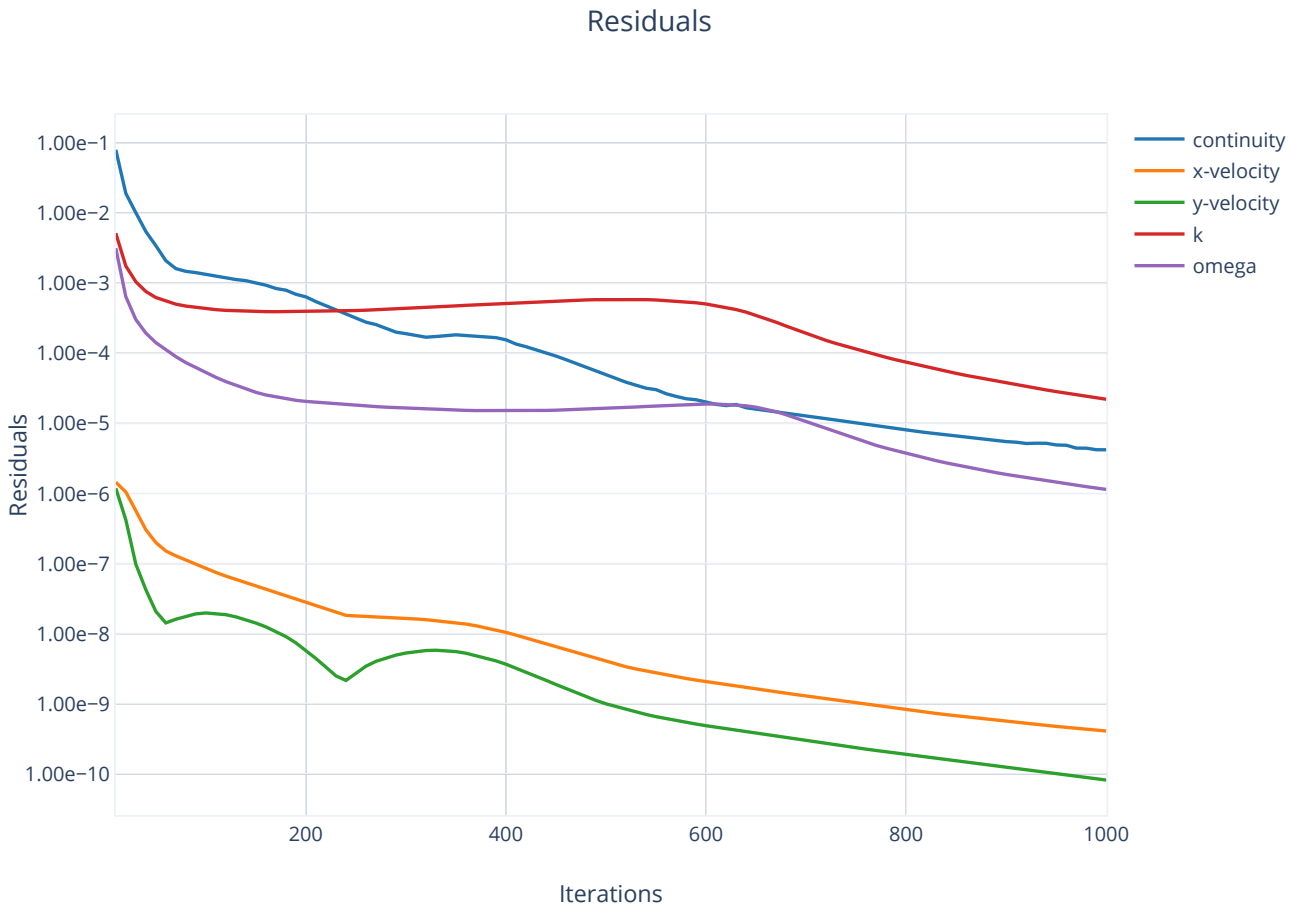
	Value	**Absolute Criteria**	**Convergence Status**
continuity	4.202548e-06	1e-07	Not Converged
x-velocity	4.081197e-10	0.001	Converged
y-velocity	8.152808e-11	0.001	Converged
k	2.211796e-05	0.001	Converged
omega	1.143564e-06	0.001	Converged

Report Definitions

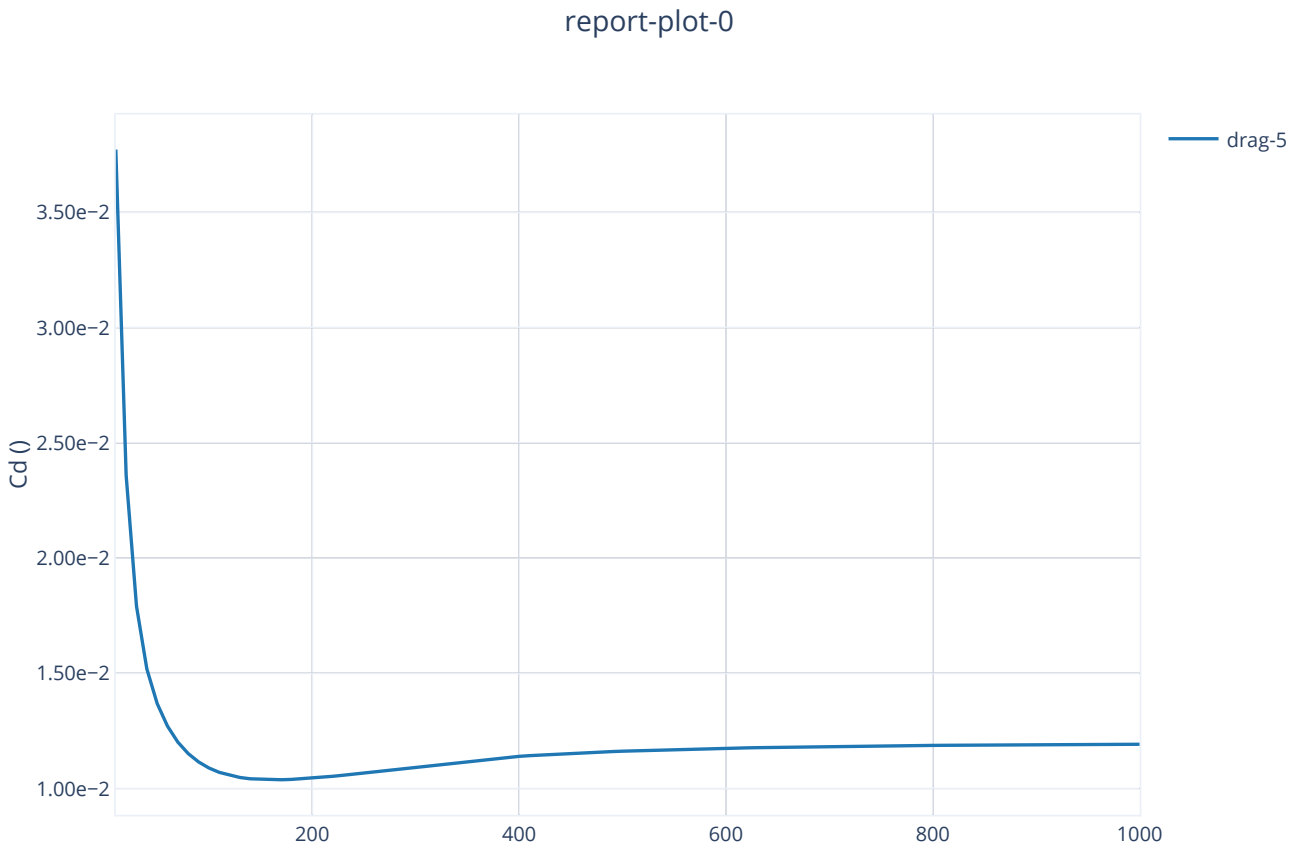
lift-5	0.5275484
drag-5	0.01192058

Plots

Residuals

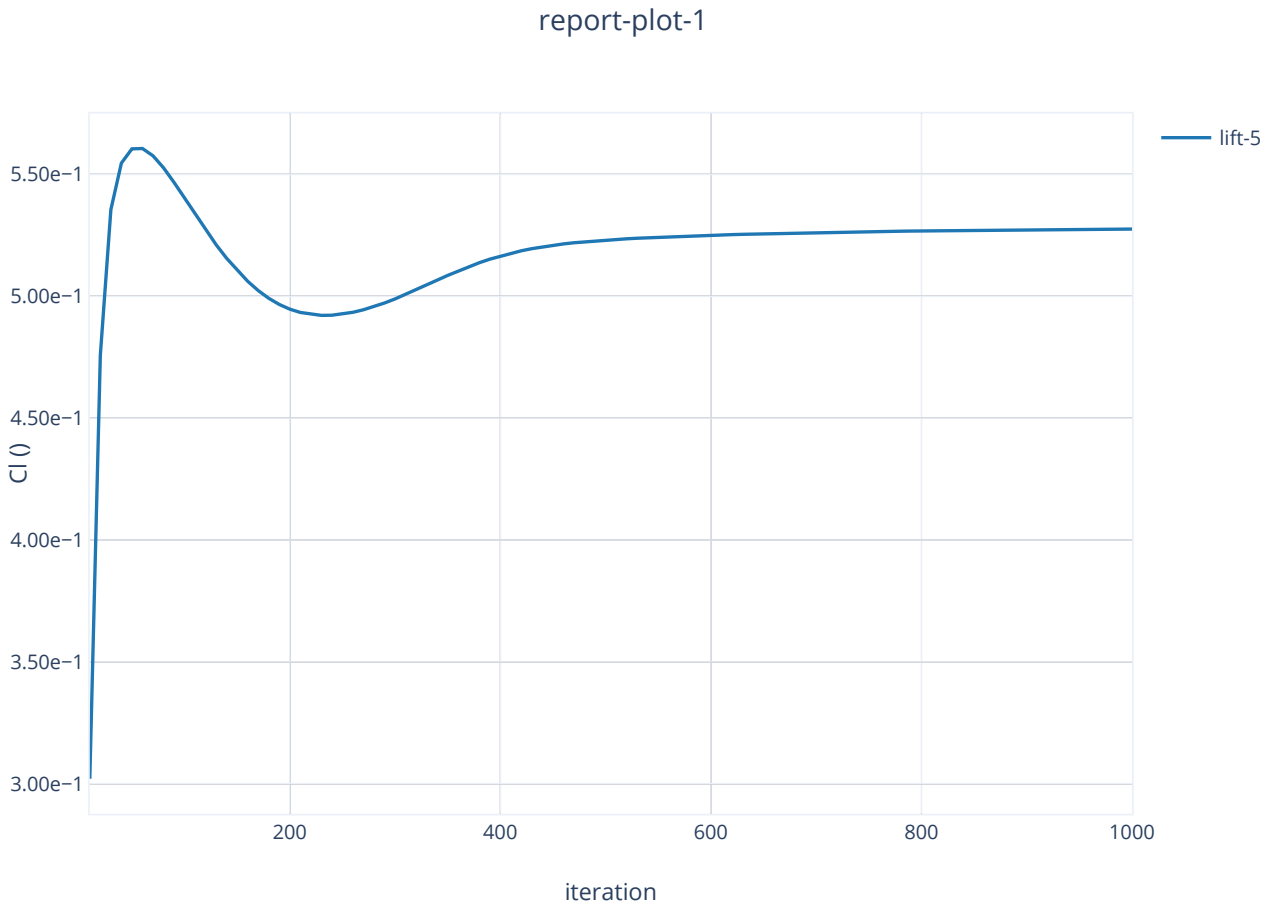


report-plot-0



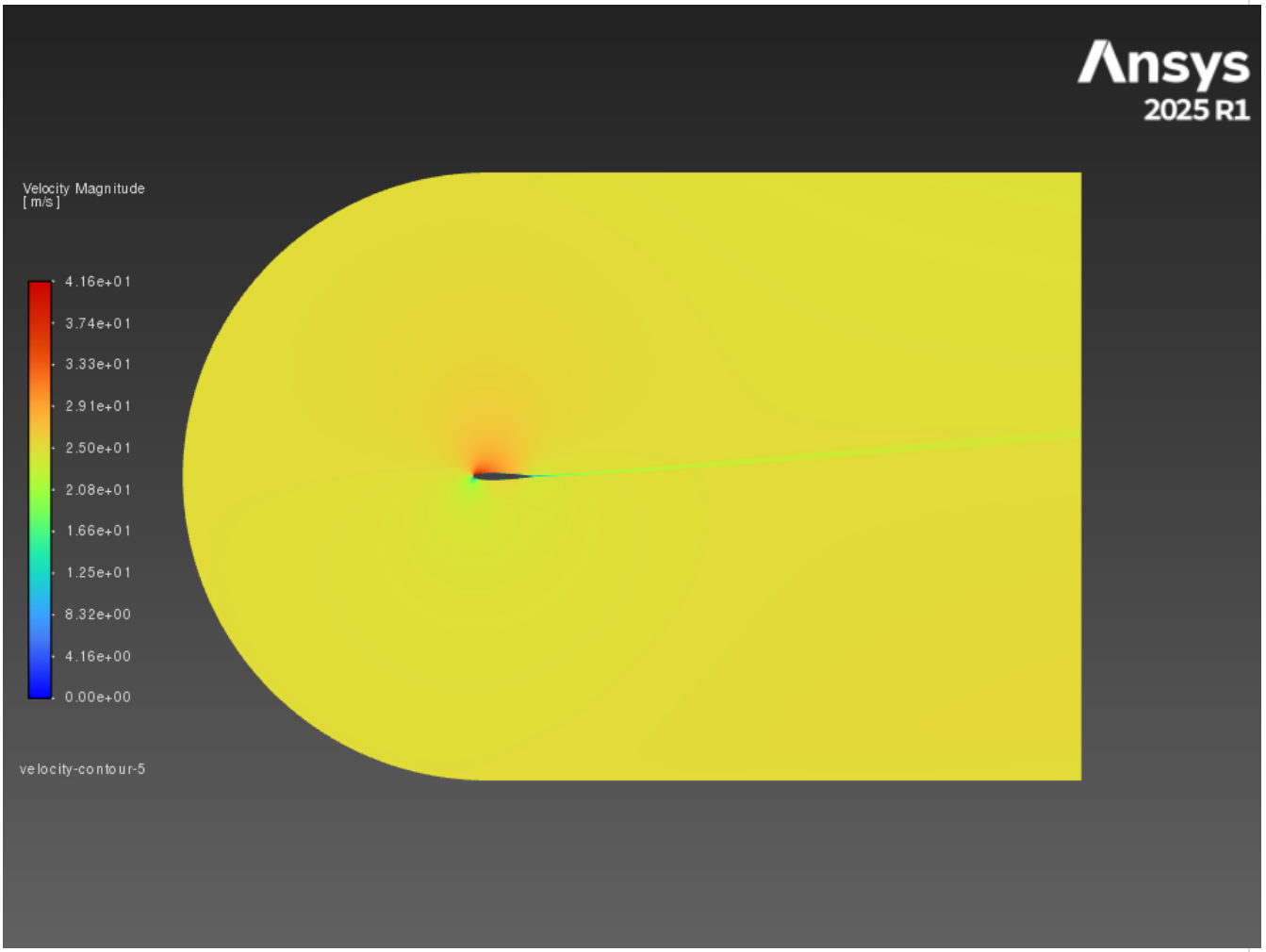
iteration

report-plot-1

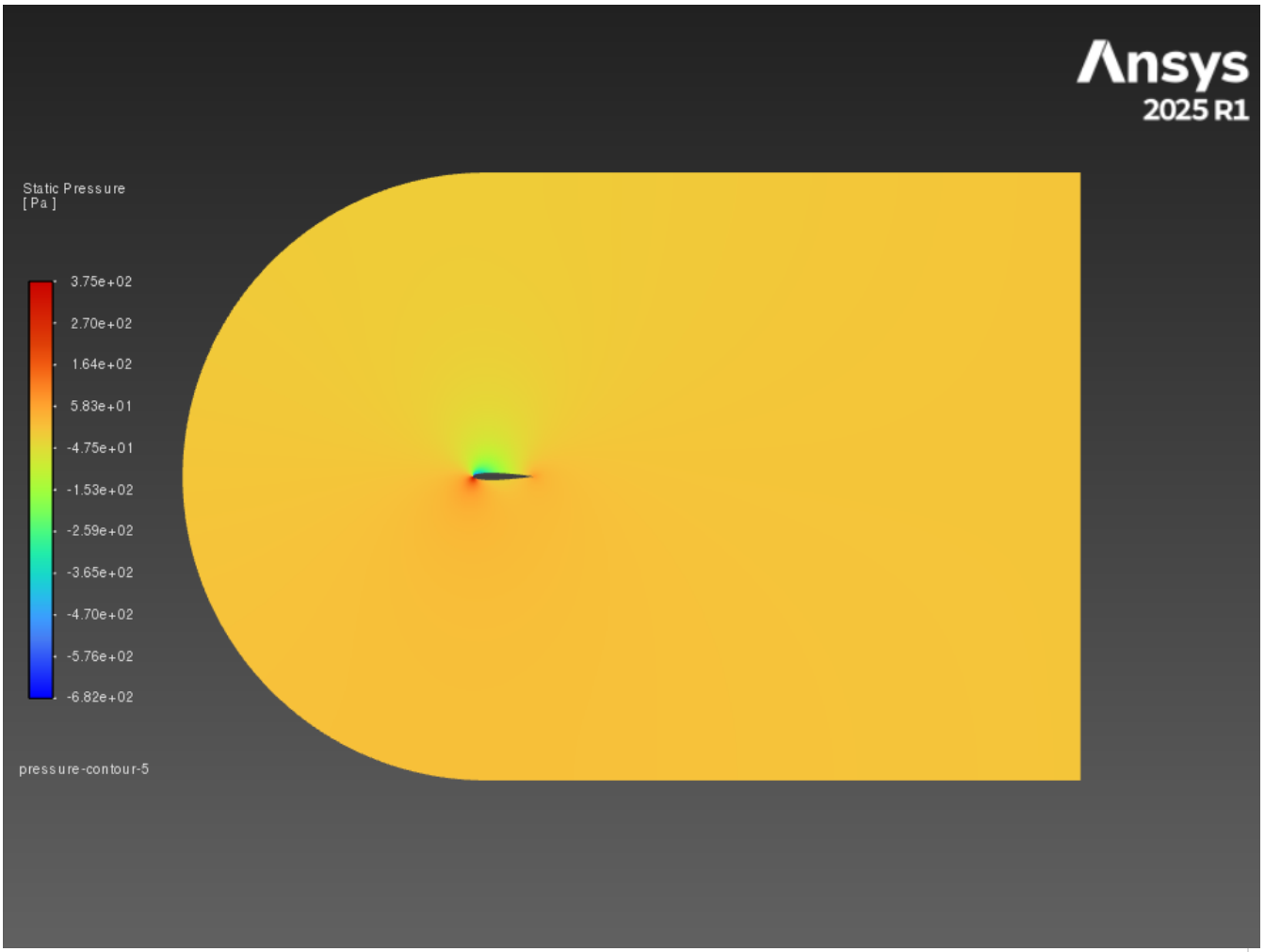


Contours

velocity-contour-5



pressure-contour-5


Ansys
2025 R1
Static Pressure
[Pa]
3.75e+02
2.70e+02
1.64e+02
5.83e+01
-4.75e+01
-1.53e+02
-2.59e+02
-3.65e+02
-4.70e+02
-5.76e+02
-6.82e+02
pressure-contour-5