Ansys 2022 R2

Ansys Fluent Simulation Report

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Geometry and Mesh

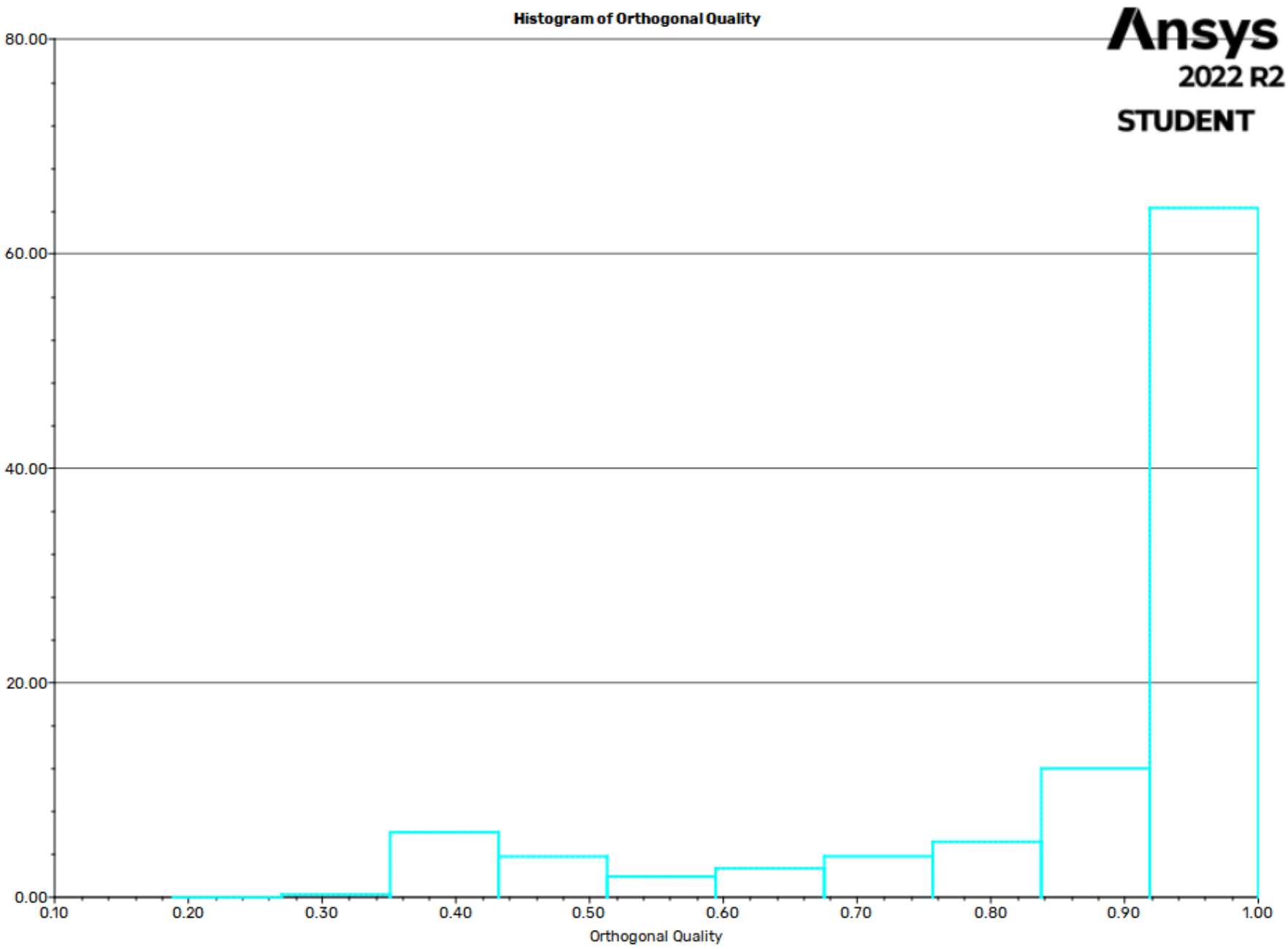
Mesh Size

Cells	Faces	Nodes
192883	878485	518748

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
component1-fluid	Poly Cell	0.18854607	1076.6765

Orthogonal Quality



Simulation Setup

Physics

Models

Model	Settings
Space	3D
Time	Steady
Viscous	SST k-omega turbulence model
Heat Transfer	Enabled

Material Properties

− Fluid	
− air	
Density	ideal gas
Cp (Specific Heat)	1006.43 J/(kg K)
Thermal Conductivity	0.0242 W/(m K)
Viscosity	sutherland
Molecular Weight	28.966 kg/kmol

− Solid	
− aluminum	
Density	2719 kg/m^3
Cp (Specific Heat)	871 J/(kg K)
Thermal Conductivity	202.4 W/(m K)

Cell Zone Conditions

− Fluid	
− component1-fluid	
Material Name	air
Specify source terms?	no
Specify fixed values?	no
Frame Motion?	no
Laminar zone?	no
Porous zone?	no
3D Fan Zone?	no

Boundary Conditions

− Inlet	
− farfield	
Gauge Pressure [Pa]	73048
Mach Number	0.7
Temperature [K]	283.24
Coordinate System	Cartesian (X, Y, Z)
Component of Flow Direction (x,y,z)	(cos(attackang), sin(attackang), 0)
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	1
Turbulent Viscosity Ratio	1
− Symmetry	
sym-1	symmetry
sym-2	symmetry
− Wall	
− airfoil_lower	
Wall Thickness [m]	0
Heat Generation Rate [W/m^3]	0
Material Name	aluminum
Thermal BC Type	Heat Flux
Heat Flux [W/m^2]	0
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1

▬ airfoil_upper	
Wall Thickness [m]	0
Heat Generation Rate [W/m^3]	0
Material Name	aluminum
Thermal BC Type	Heat Flux
Heat Flux [W/m^2]	0
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
▬ airfoil_te	
Wall Thickness [m]	0
Heat Generation Rate [W/m^3]	0
Material Name	aluminum
Thermal BC Type	Heat Flux
Heat Flux [W/m^2]	0
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1

Reference Values

Area	0.1 m^2
Density	0.8984783 kg/m^3
Enthalpy	12860.96 J/kg
Length	1 m
Pressure	73048 Pa
Temperature	283.24 K
Velocity	236.0798 m/s
Viscosity	1.765733e-05 kg/(m s)
Ratio of Specific Heats	1.4
Yplus for Heat Tran. Coef.	300
Reference Zone	component1-fluid

Solver Settings

▬ Equations	
Flow	True

Turbulence	True
Energy	True
— Numerics	
Absolute Velocity Formulation	True
— Pseudo Time Explicit Relaxation Factors	
Density	1
Body Forces	1
Turbulent Kinetic Energy	0.75
Specific Dissipation Rate	0.75
Turbulent Viscosity	1
Energy	0.75
Explicit Momentum	0.5
Explicit Pressure	0.5
— Pressure-Velocity Coupling	
Type	Coupled
Pseudo Time Method (Global Time Step)	True
— Discretization Scheme	
Pressure	Second Order
Density	Second Order Upwind
Momentum	Second Order Upwind
Turbulent Kinetic Energy	Second Order Upwind
Specific Dissipation Rate	Second Order Upwind
Energy	Second Order Upwind
— Solution Limits	
Minimum Absolute Pressure [Pa]	1
Maximum Absolute Pressure [Pa]	5e+10
Minimum Temperature [K]	1
Maximum 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	1
Case Read	2.411 seconds
Iteration	887.137 seconds
AMG	572.605 seconds
Virtual Current Memory	1.30819 GB
Virtual Peak Memory	1.69326 GB
Memory Per M Cell	5.16014

Solution Status

Iterations: 250

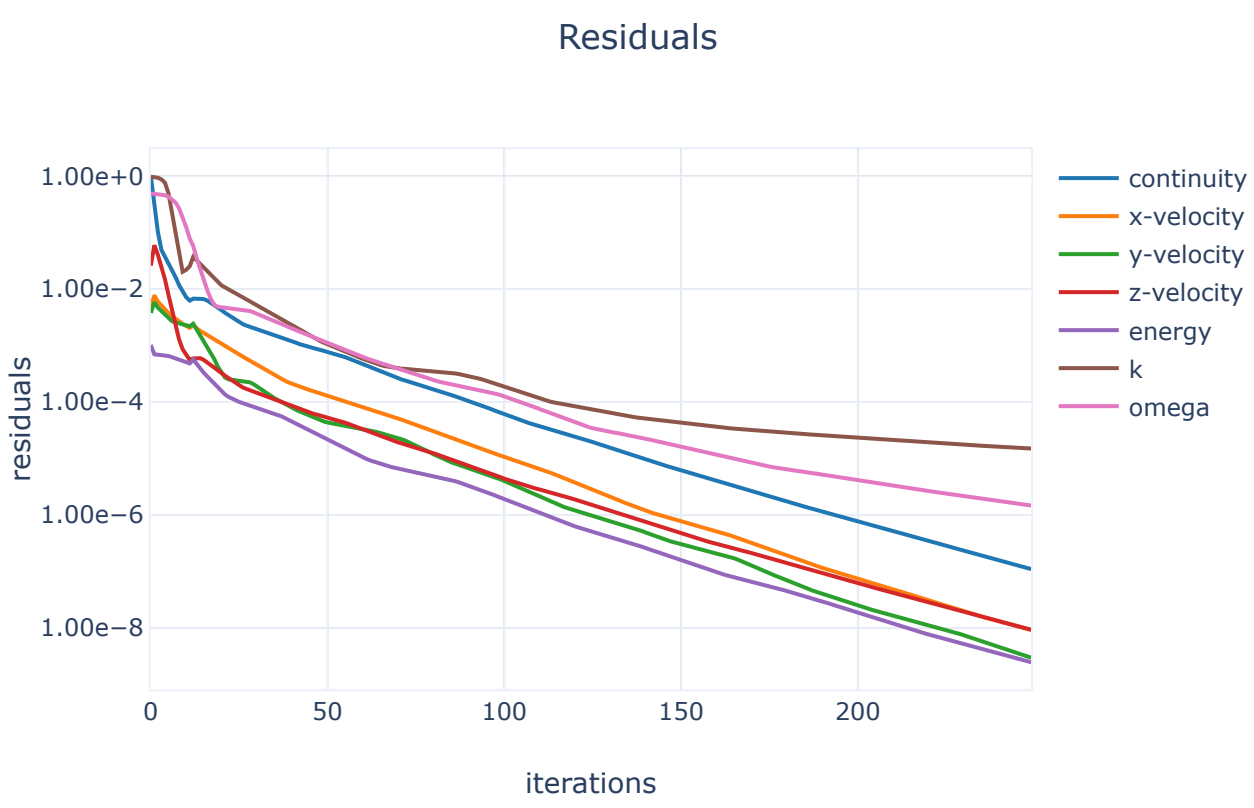
	Value	Absolute Criteria	Convergence Status
continuity	1.099958e-07	0.001	Converged
x-velocity	9.203444e-09	0.001	Converged
y-velocity	2.972352e-09	0.001	Converged
z-velocity	9.271838e-09	0.001	Converged
energy	2.469863e-09	1e-06	Converged
k	1.50098e-05	0.001	Converged
omega	1.469142e-06	0.001	Converged

Report Definitions

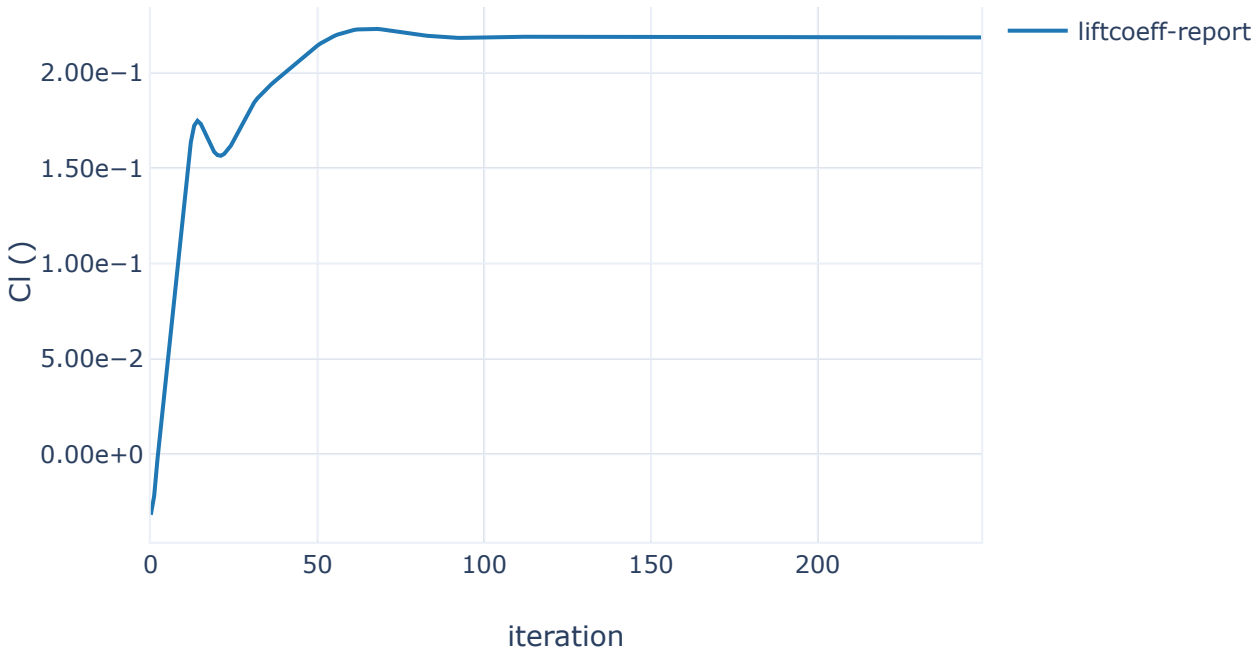
dragcoeff-report	0.00922524	
liftcoeff-report	0.2186249	

Plots

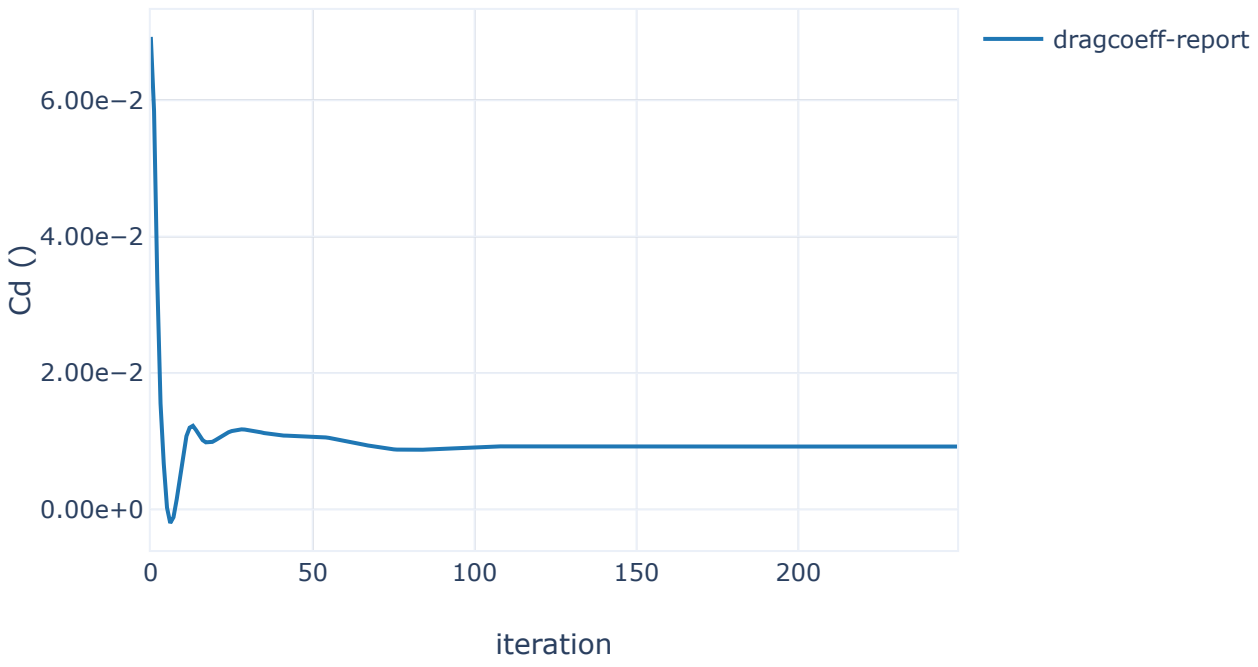
Residuals



liftcoeff-report-rplot

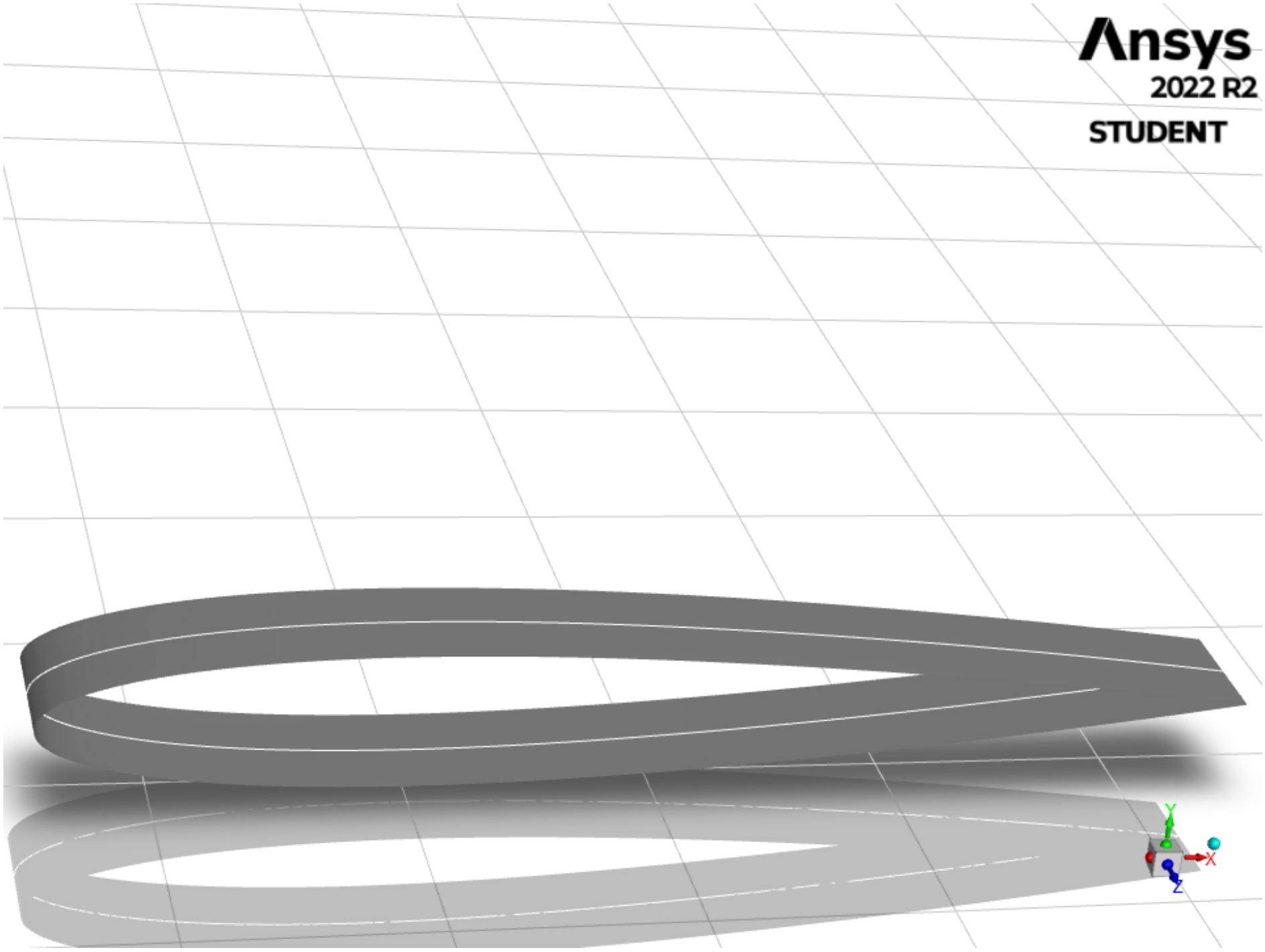


dragcoeff-report-rplot



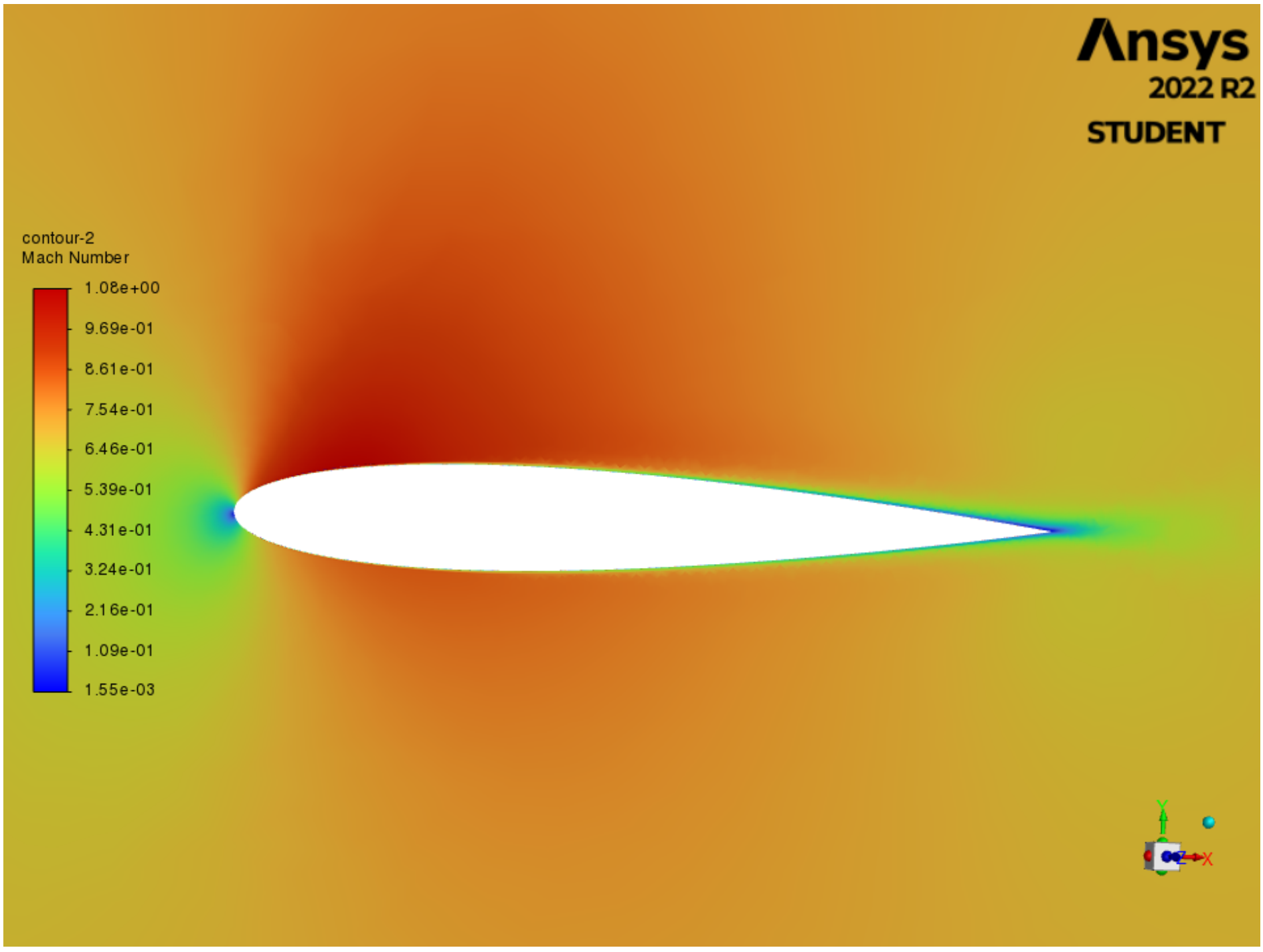
Mesh

mesh-1



Contours

contour-2


Ansys
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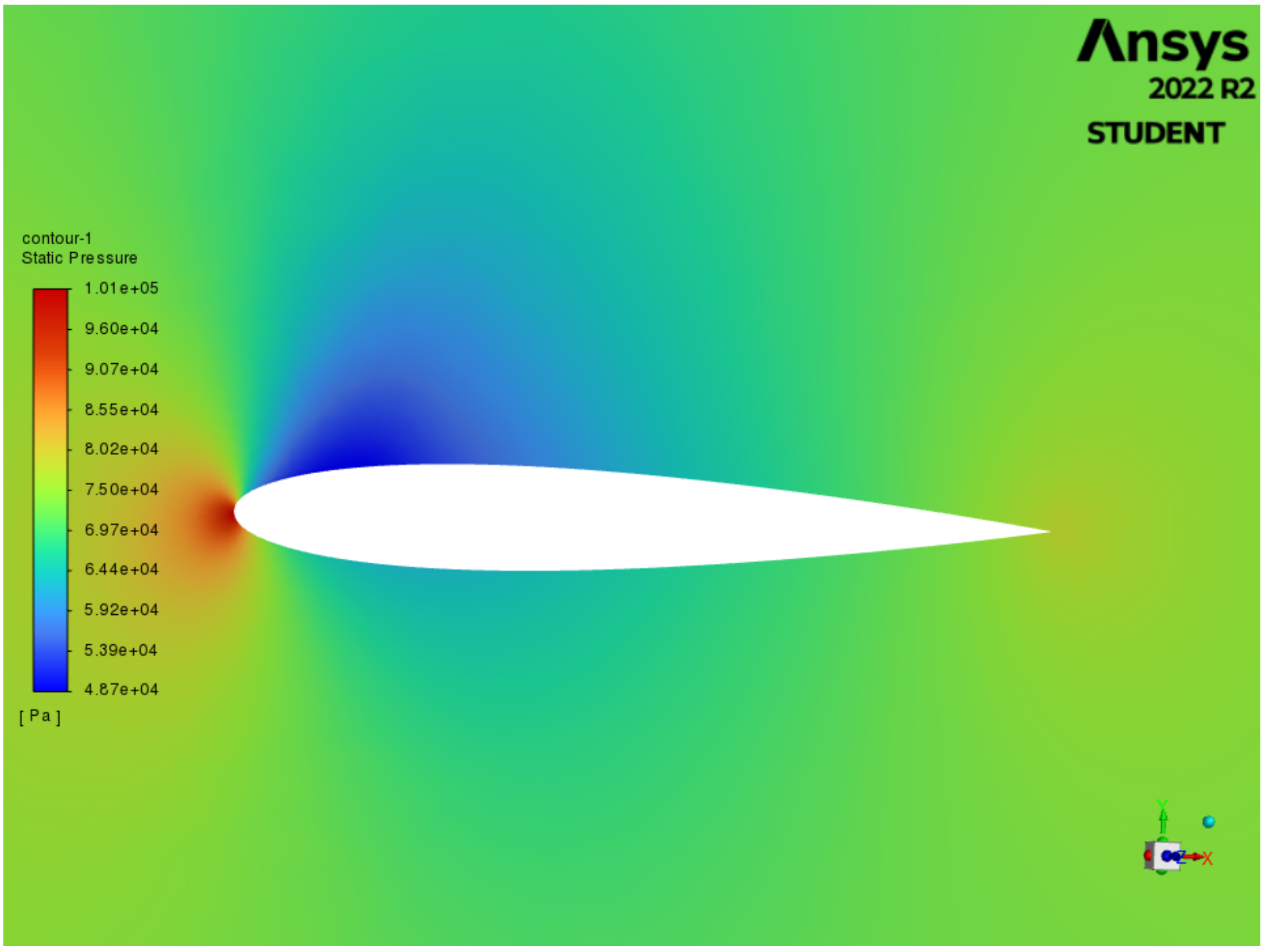
contour-2
Mach Number
1.08e+00
9.69e-01
8.61e-01
7.54e-01
6.46e-01
5.39e-01
4.31e-01
3.24e-01
2.16e-01
1.09e-01
1.55e-03
Y
X

contour-1


Ansys
2022 R2
STUDENT
contour-1
Static Pressure
1.01e+05
9.60e+04
9.07e+04
8.55e+04
8.02e+04
7.50e+04
6.97e+04
6.44e+04
5.92e+04
5.39e+04
4.87e+04
[Pa]
Y
X