Ansys Fluent Simulation Report

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Date	11/15/2023 08:10 PM

Table of Contents

System Information

Application	Fluent
Settings	3d, pressure-based, SST k-omega
Version	23.2.0-10212
Source Revision	27b6146783
Build Time	May 29 2023 07:59:57 EDT
CPU	Intel(R) Core(TM) i7-10750H
OS	Windows

Geometry and Mesh

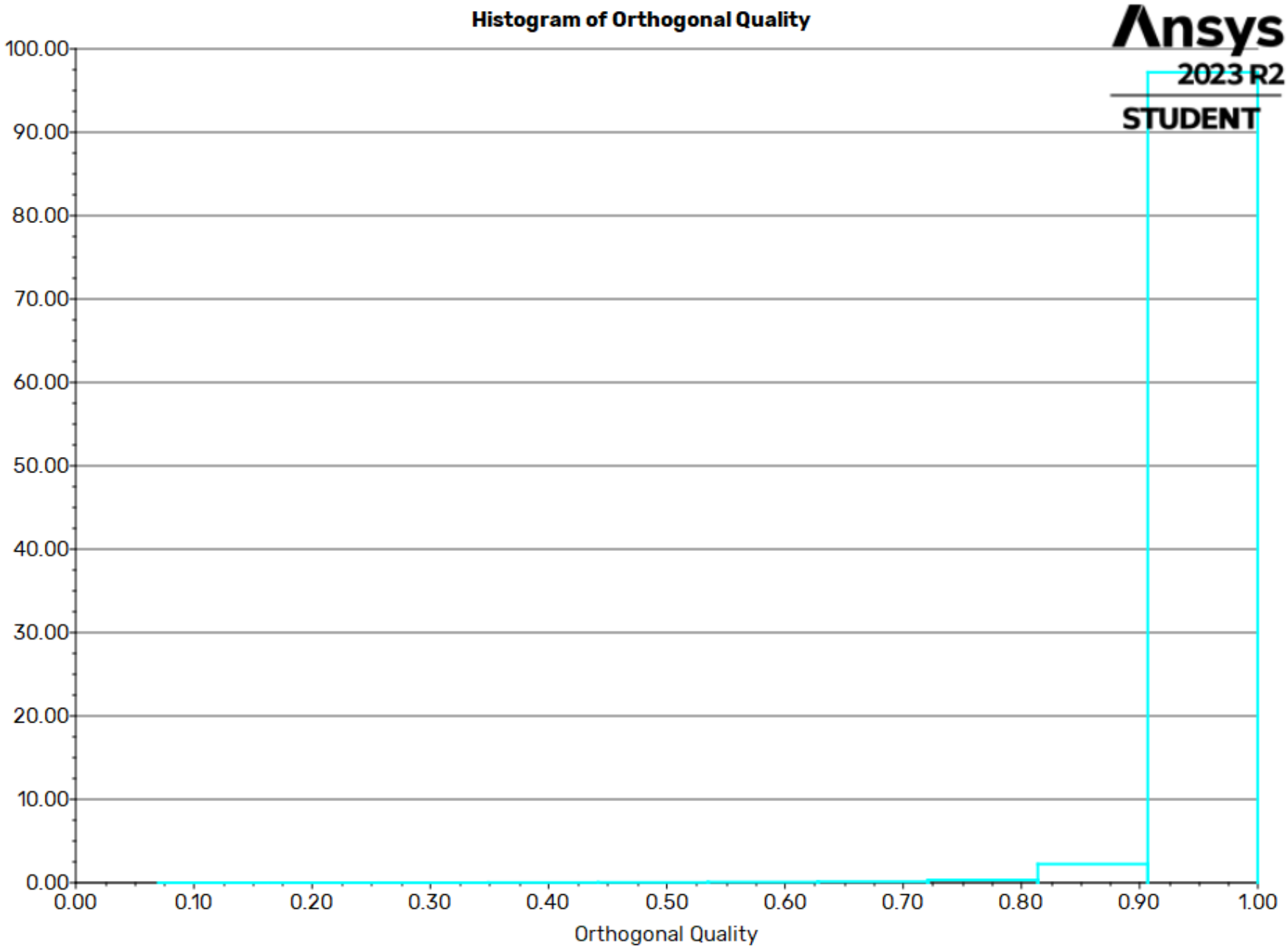
Mesh Size

Cells	Faces	Nodes
644593	4113125	3261544

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
solid	Poly Cell	0.07009735	113.39218

Orthogonal Quality



Simulation Setup

Physics

Models

Model	Settings

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

Material Properties

— Fluid	
— air	
Density	1 kg/m^3
Cp (Specific Heat)	1006.43 J/(kg K)
Thermal Conductivity	0.0242 W/(m K)
Viscosity	1.7894e-05 kg/(m s)
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	
— solid	
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	
— wall_top	
Reference Frame	Absolute
Gauge Total Pressure [Pa]	0
Supersonic/Initial Gauge Pressure [Pa]	0
Direction Specification Method	Normal to Boundary
Build artificial walls to prevent reverse flow?	no
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
Note: Reinjected particles do not change their injection association	no
— inlet	
Velocity Specification Method	Magnitude, Normal to Boundary

Reference Frame	Absolute
Velocity Magnitude [m/s]	50
Supersonic/Initial Gauge Pressure [Pa]	0
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
Note: Reinjected particles do not change their injection association	no
▬ Outlet	
▬ wall_outside	
Backflow Reference Frame	Absolute
Gauge Pressure [Pa]	0
Pressure Profile Multiplier	1
Backflow Direction Specification Method	Normal to Boundary
Turbulent Specification Method	Intensity and Viscosity Ratio
Backflow Turbulent Intensity [%]	5
Backflow Turbulent Viscosity Ratio	10
Note: Reinjected particles do not change their injection association	no
Backflow Pressure Specification	Total Pressure
Build artificial walls to prevent reverse flow?	no
Radial Equilibrium Pressure Distribution	no
Average Pressure Specification?	no
Specify targeted mass flow rate	no
▬ outlet	
Backflow Reference Frame	Absolute
Gauge Pressure [Pa]	0
Pressure Profile Multiplier	1
Backflow Direction Specification Method	Normal to Boundary
Turbulent Specification Method	Intensity and Viscosity Ratio
Backflow Turbulent Intensity [%]	5
Backflow Turbulent Viscosity Ratio	10
Note: Reinjected particles do not change their injection association	no
Backflow Pressure Specification	Total Pressure
Build artificial walls to prevent reverse flow?	no
Radial Equilibrium Pressure Distribution	no
Average Pressure Specification?	no
Specify targeted mass flow rate	no
▬ Symmetry	
wall_symmetry	symmetry
▬ Wall	
▬ wall_airfoil	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	rough bc standard
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5

— wall_bottom	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	rough bc standard
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5

Reference Values

Area	18 m^2
Density	1.225 kg/m^3
Enthalpy	0 J/kg
Length	1 m
Pressure	0 Pa
Temperature	288.16 K
Velocity	1 m/s
Viscosity	1.7894e-05 kg/(m s)
Ratio of Specific Heats	1.4
Yplus for Heat Tran. Coef.	300
Reference Zone	solid

Solver Settings

— Equations	
Flow	True
Turbulence	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
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
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	4
Case Read	12.243 seconds
Iteration	1336.22 seconds
AMG	697.48 seconds
Virtual Current Memory	3.53255 GB
Virtual Peak Memory	6.22686 GB
Memory Per M Cell	5.00288

Solution Status

Iterations: 207

	Value	Absolute Criteria	Convergence Status
continuity	0.0232453	0.001	Not Converged
x-velocity	0.0001935487	0.001	Converged
y-velocity	7.717486e-05	0.001	Converged
z-velocity	6.491716e-05	0.001	Converged
k	0.01865638	0.001	Not Converged
omega	0.007551495	0.001	Not Converged

Report Definitions

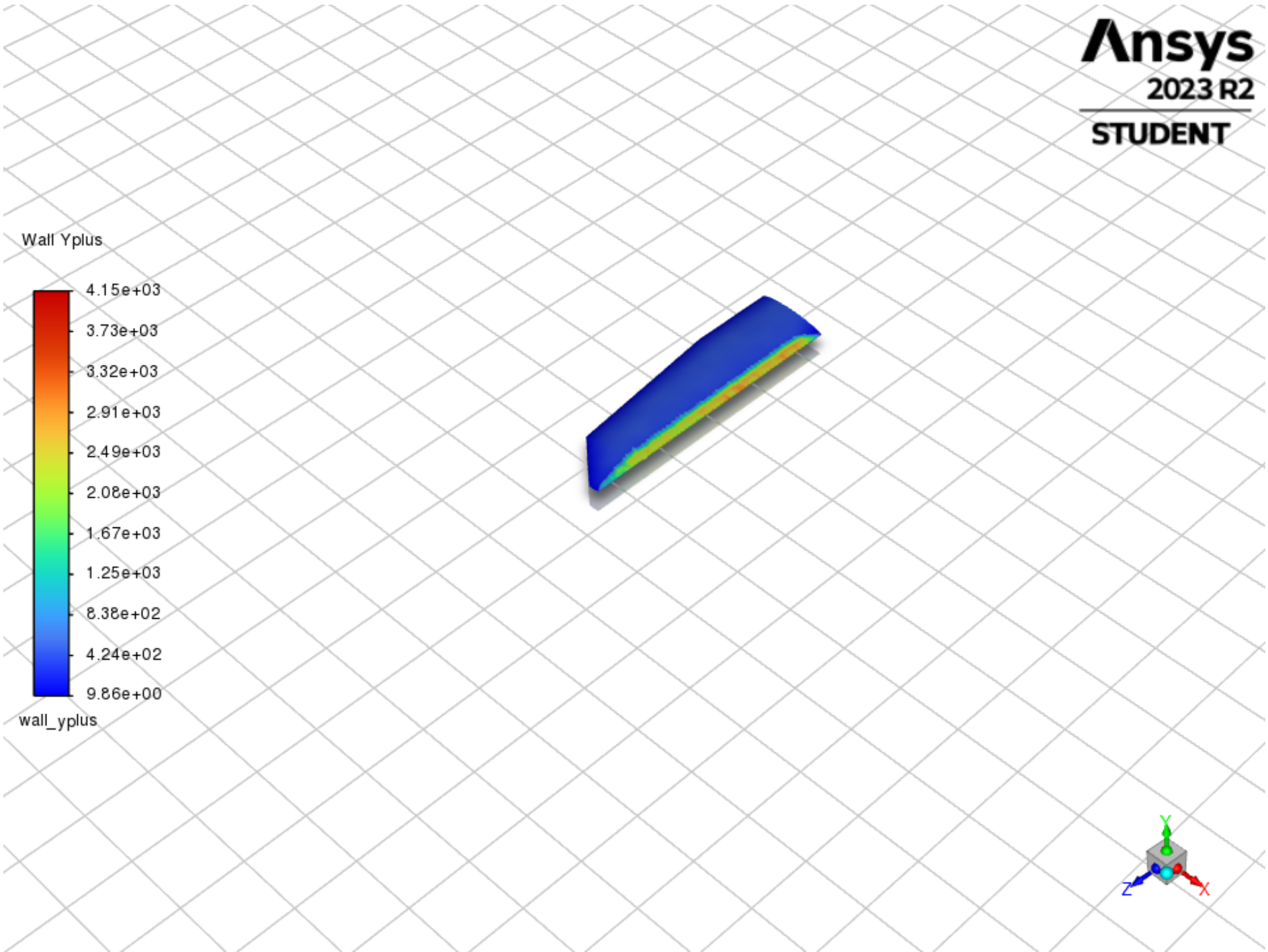
report-def-0	6103.764	N

Plots

Residuals

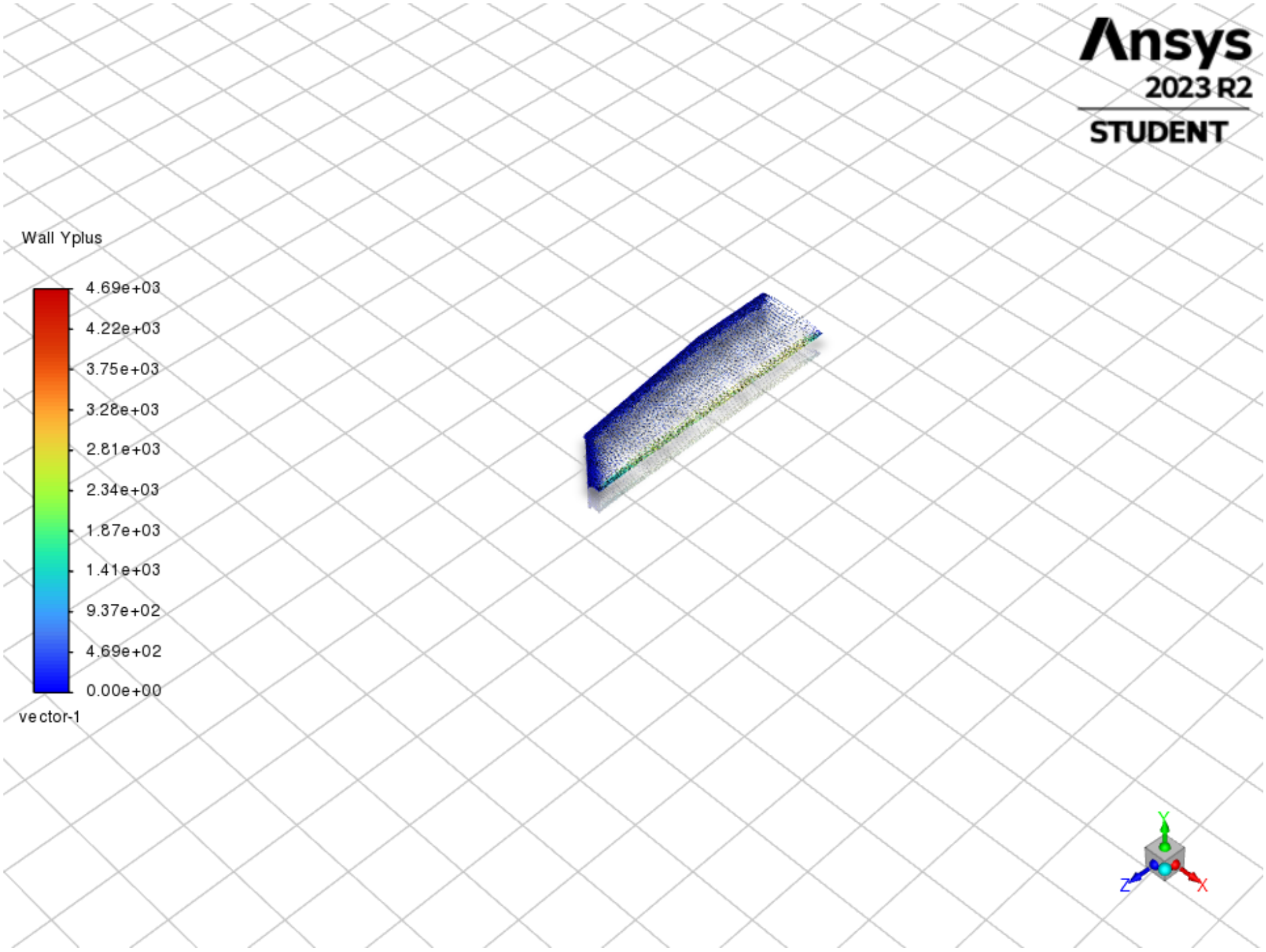
Contours

wall_yplus



Vectors

vector-1



XY Plots

xy-plot-1