Ansys 2022 R2

Ansys Fluent Simulation Report

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Geometry and Mesh

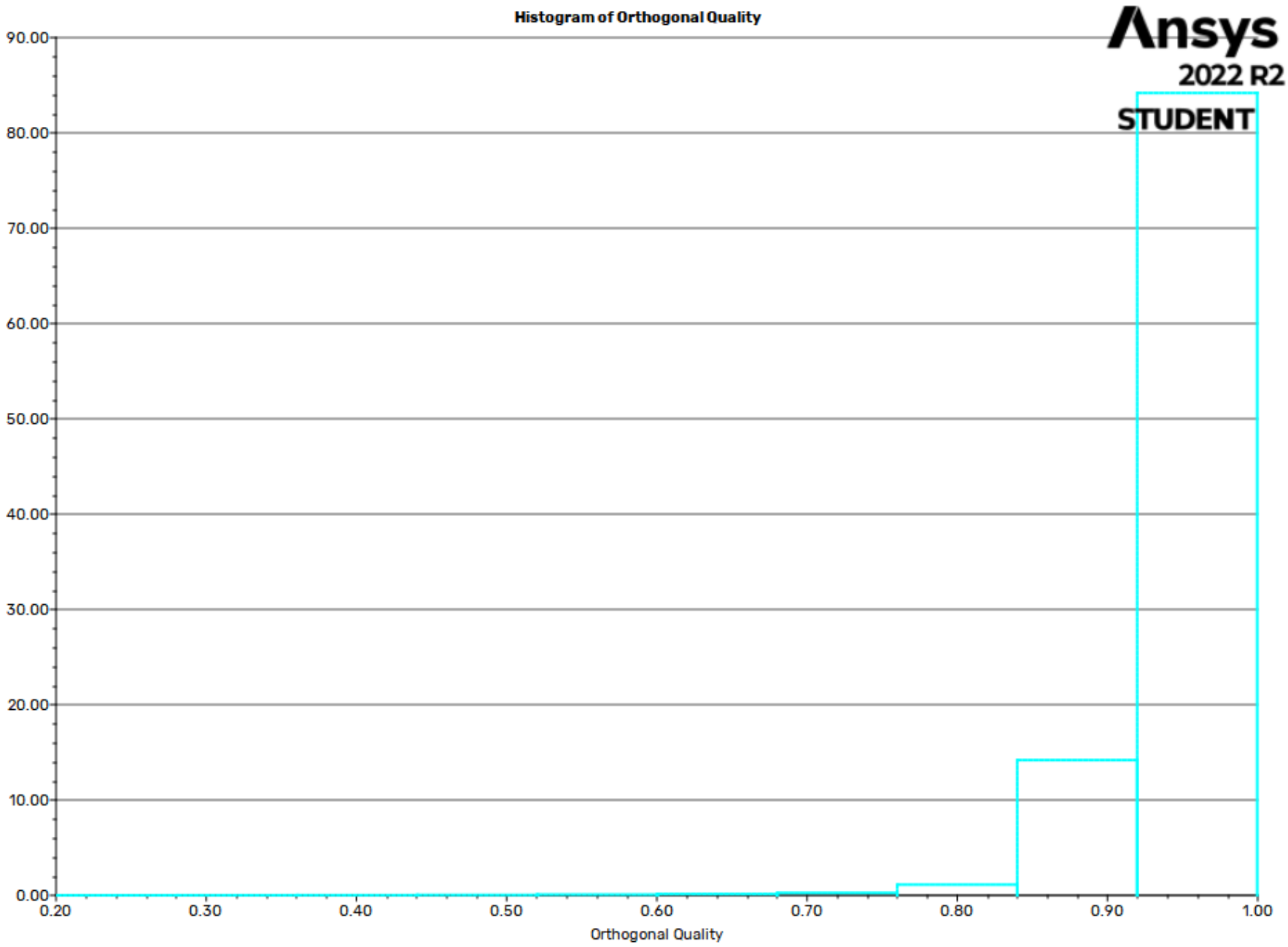
Mesh Size

Cells	Faces	Nodes
232232	1441041	1105153

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
fluid1	Poly Cell	0.50259122	9.745025
solid_up	Poly Cell	0.20085636	51.868445

Orthogonal Quality



Simulation Setup

Physics

Models

Model	Settings
Space	3D
Time	Steady
Viscous	Realizable k-epsilon turbulence model
Wall Treatment	Scalable Wall Function

Material Properties

− Fluid	
− air	
Density	1.225 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)

Boundary Conditions

— Inlet	
— velo-inlet	
Velocity Specification Method	Magnitude, Normal to Boundary
Reference Frame	Absolute
Velocity Magnitude [m/s]	10
Supersonic/Initial Gauge Pressure [Pa]	0
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
— velo-inlet_1	
Velocity Specification Method	Magnitude, Normal to Boundary
Reference Frame	Absolute
Velocity Magnitude [m/s]	10
Supersonic/Initial Gauge Pressure [Pa]	0
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
— velo-inlet_2	
Velocity Specification Method	Magnitude, Normal to Boundary
Reference Frame	Absolute
Velocity Magnitude [m/s]	10
Supersonic/Initial Gauge Pressure [Pa]	0
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
— Outlet	
— pres_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
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
▬ Wall	
solid_up:1	wall
in1	wall
in2	wall
in3	wall
out1	wall
solid_up:1:580	wall
▬ solid_up:1:581	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
solid_up:1:582	wall
solid_up:1:583	wall
solid_up:1:584	wall
solid_up:1:581-shadow	wall

Reference Values

Area	1 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	fluid1

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
Turbulent 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	First Order Upwind
Turbulent Dissipation Rate	First 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 Turb. Dissipation Rate [m^2/s^3]	1e-20
Maximum Turb. Viscosity Ratio	100000

Run Information

Number of Machines	1
Number of Cores	1
Case Read	5.744 seconds
Iteration	150.445 seconds
AMG	98.836 seconds
Virtual Current Memory	0.614582 GB
Virtual Peak Memory	1.81338 GB
Memory Per M Cell	2.28211

Solution Status

Iterations: 107

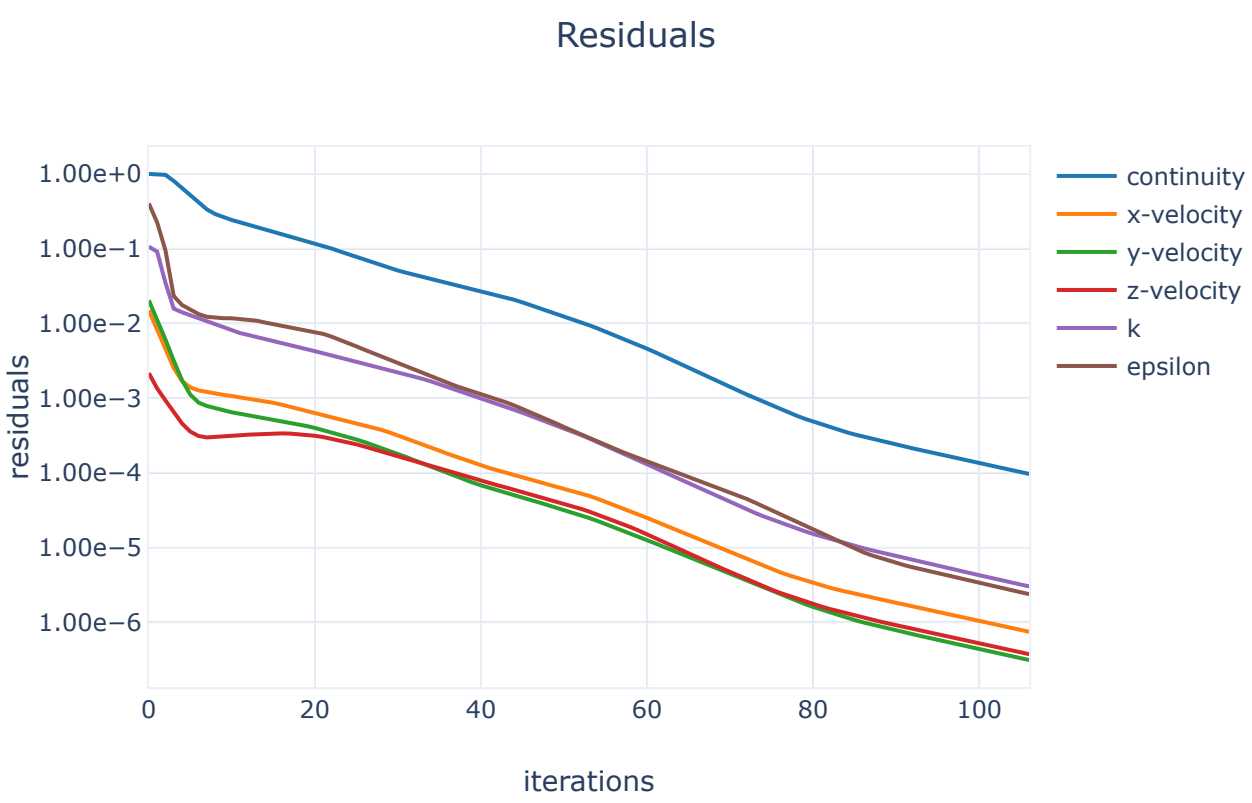
	Value	Absolute Criteria	Convergence Status
continuity	9.668843e-05	0.0001	Converged
x-velocity	7.471052e-07	0.0001	Converged
y-velocity	3.126341e-07	0.0001	Converged
z-velocity	3.744097e-07	0.0001	Converged
k	3.020638e-06	0.0001	Converged
epsilon	2.380609e-06	0.0001	Converged

Report Definitions

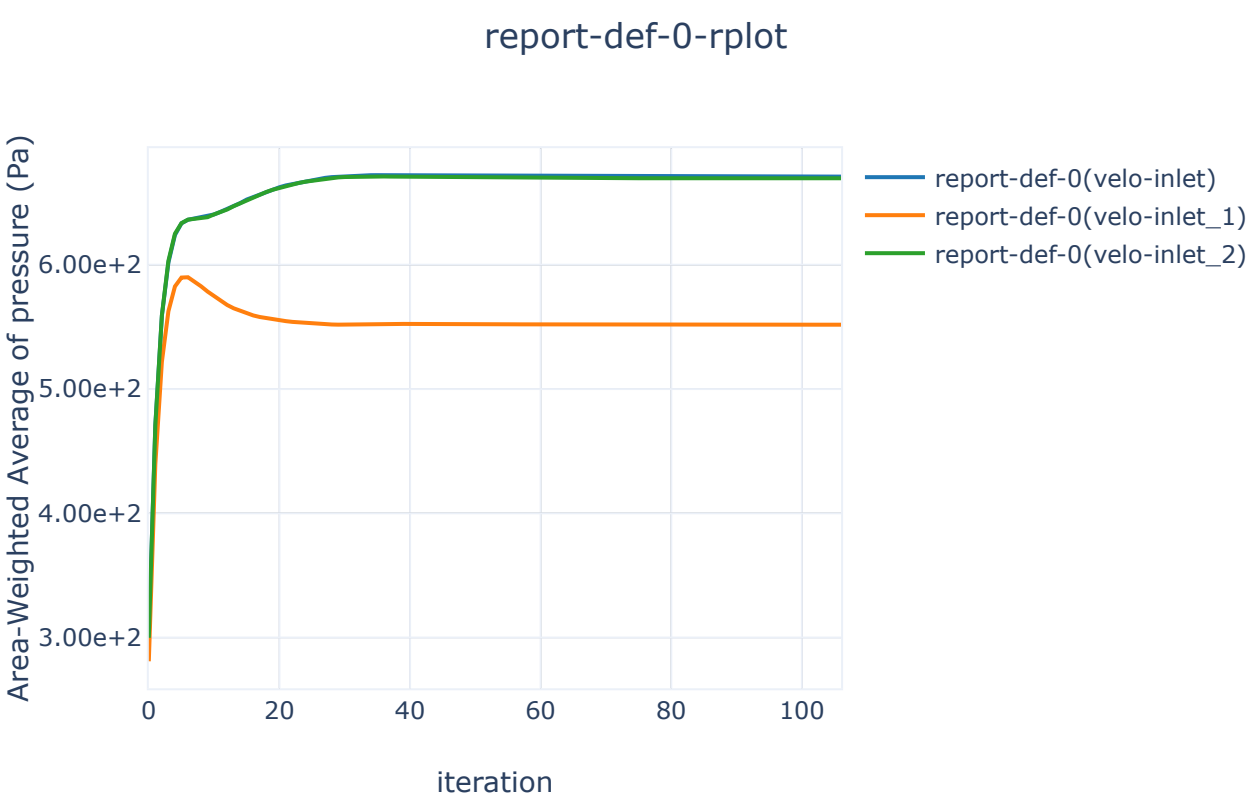
− report-def-0	630.7663	Pa
velo-inlet	670.9322	Pa
velo-inlet_1	551.7631	Pa
velo-inlet_2	669.5965	Pa

Plots

Residuals

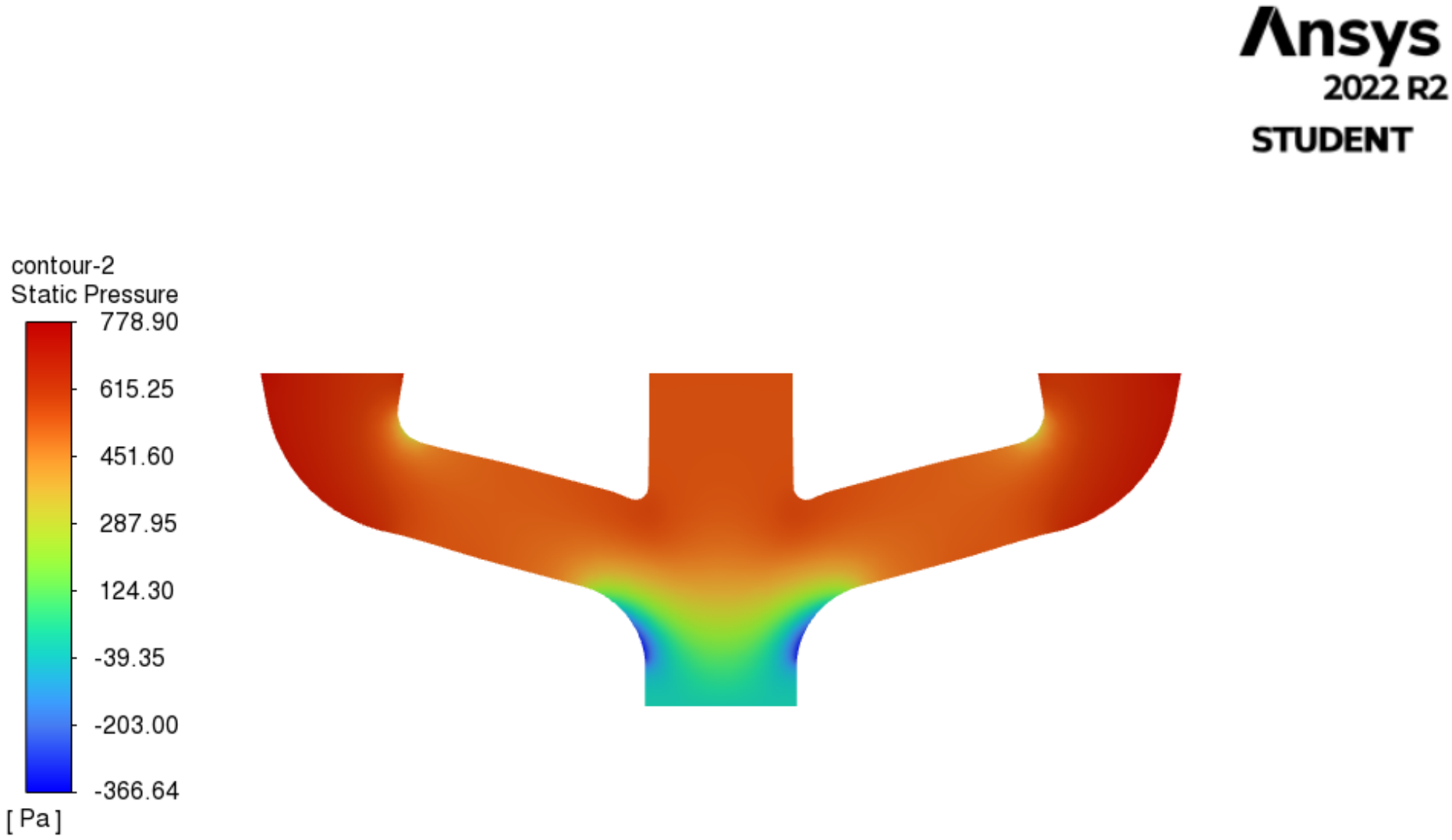


report-def-0-rplot

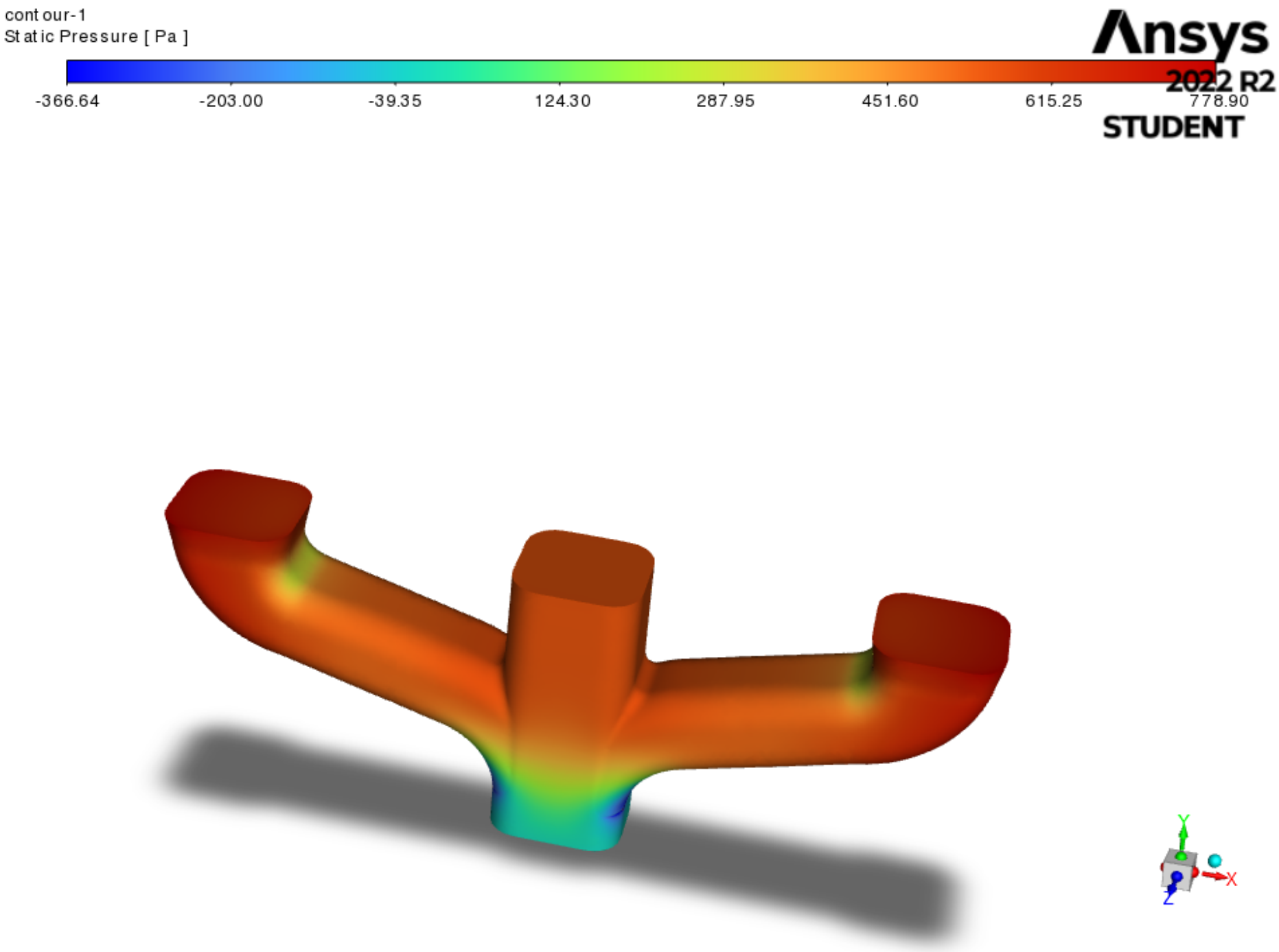


Contours

contour-2

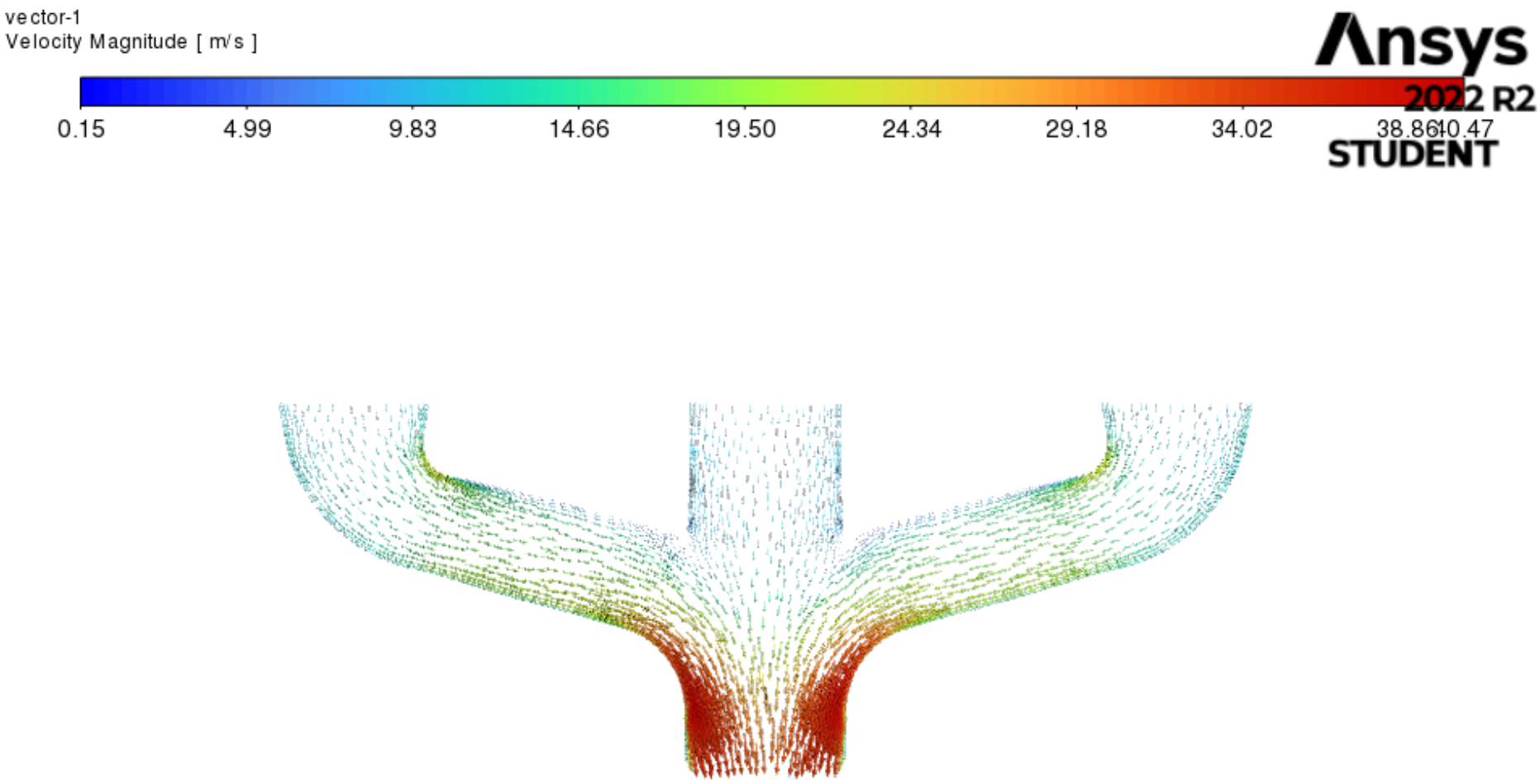


contour-1

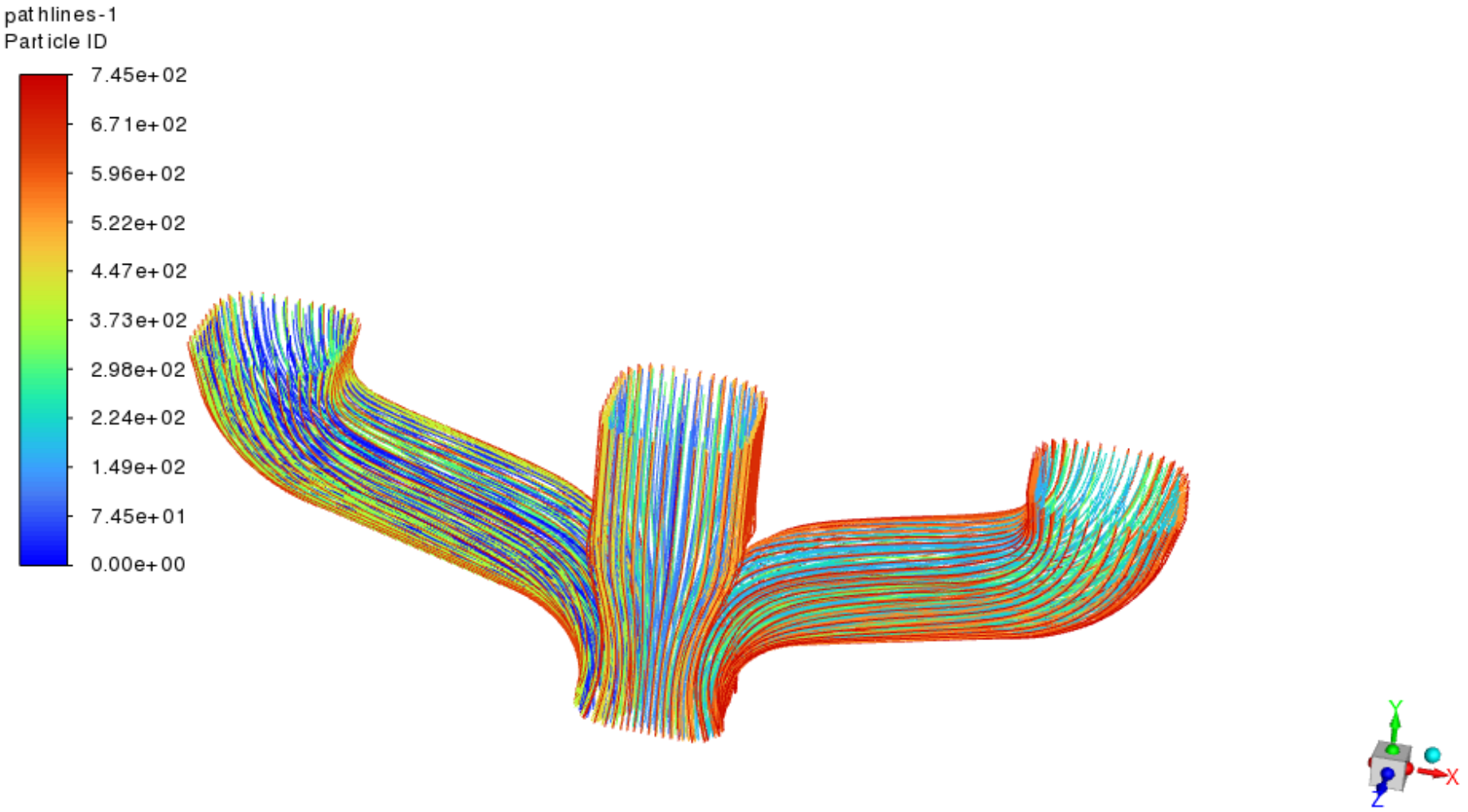


Vectors

vector-1



Pathlines

pathlines-1

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