Ansys 2022 R2

Ansys Fluent Simulation Report

Analyst	akten
Date	12/29/2022 08:5 PM

Table of Contents

System Information

Application	Fluent
Settings	3d, double precision, pressure-based, VOF, standard k-epsilon
Version	22.2.0-10212
Source Revision	61a5bc1c97
Build Time	May 27 2022 08:52:44 EDT
CPU	Intel(R) Core(TM) i7-10750H
OS	Windows

Geometry and Mesh

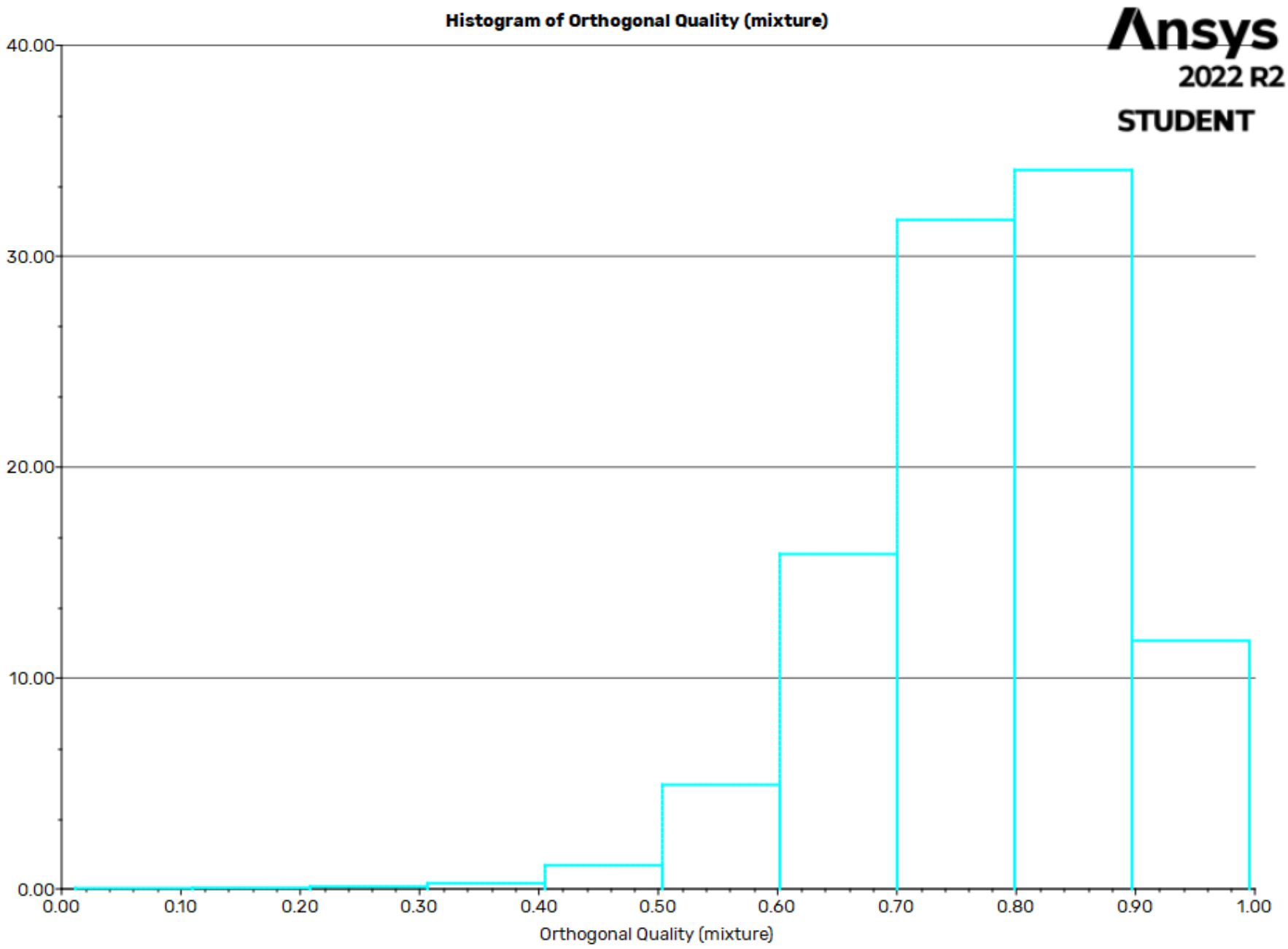
Mesh Size

Cells	Faces	Nodes
502080	1019853	91951

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
solid	Tet Cell	0.011472893	117.02161

Orthogonal Quality



Simulation Setup

Physics

Models

Model	Settings
Space	3D

Model	Settings
Time	Steady
Viscous	Standard k-epsilon turbulence model
Wall Treatment	Standard Wall Functions
Multiphase	Volume of Fluid

Material Properties

− Fluid	
− water-liquid	
Density	998.2 kg/m^3
Cp (Specific Heat)	4182 J/(kg K)
Thermal Conductivity	0.6 W/(m K)
Viscosity	0.001003 kg/(m s)
Molecular Weight	18.0152 kg/kmol
− 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)

Cell Zone Conditions

− Fluid	
− solid (mixture)	
Specify source terms?	no
Specify fixed values?	no
Frame Motion?	no
Laminar zone?	no
Porous zone?	no
3D Fan Zone?	no
Numerical Beach	no
solid (phase-1)	
solid (phase-2)	

Boundary Conditions

− Inlet	
− inlet (mixture)	
Open Channel	yes
Inlet Group ID	1

Secondary Phase for Inlet	phase 2
Reference Frame	Absolute
Direction Specification Method	Normal to Boundary
Flow Specification Method	Free Surface Level and Velocity
Free Surface Level [m]	0.15
Velocity Magnitude [m/s]	10
Bottom Level [m]	0
Density Interpolation Method	From Neighboring Cell
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
inlet (phase-1)	
inlet (phase-2)	
− Outlet	
− outlet (mixture)	
Open Channel	yes
Outlet Group ID	1
Pressure Specification Method	Free Surface Level
Free Surface Level [m]	0.15
Bottom Level [m]	-0.75
Density Interpolation Method	From Neighboring Cell
Backflow Direction Specification Method	From Neighboring Cell
Turbulent Specification Method	Intensity and Viscosity Ratio
Backflow Turbulent Intensity [%]	5
Backflow Turbulent Viscosity Ratio	10
Backflow Pressure Specification	Total Pressure
Radial Equilibrium Pressure Distribution	no
outlet (phase-1)	
outlet (phase-2)	
− Symmetry	
symetry (mixture)	
symetry (phase-1)	
symetry (phase-2)	
− Wall	
− wall-solid (mixture)	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
wall-solid (phase-1)	
wall-solid (phase-2)	
− hull (mixture)	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0

Wall Roughness Constant	0.5
hull (phase-1)	
hull (phase-2)	

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	solid

Solver Settings

— Equations	
Flow	True
Volume Fraction	True
Turbulence	True
— Numerics	
Absolute Velocity Formulation	True
— Pseudo Time Explicit Relaxation Factors	
Density	1
Body Forces	1
Volume Fraction	0.5
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	PRESTO!
Momentum	Second Order Upwind
Volume Fraction	Compressive
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	4
Case Read	20.464 seconds
Iteration	413.477 seconds
AMG	236.792 seconds
Virtual Current Memory	2.37994 GB
Virtual Peak Memory	3.05695 GB
Memory Per M Cell	4.06245

Solution Status

Iterations: 200

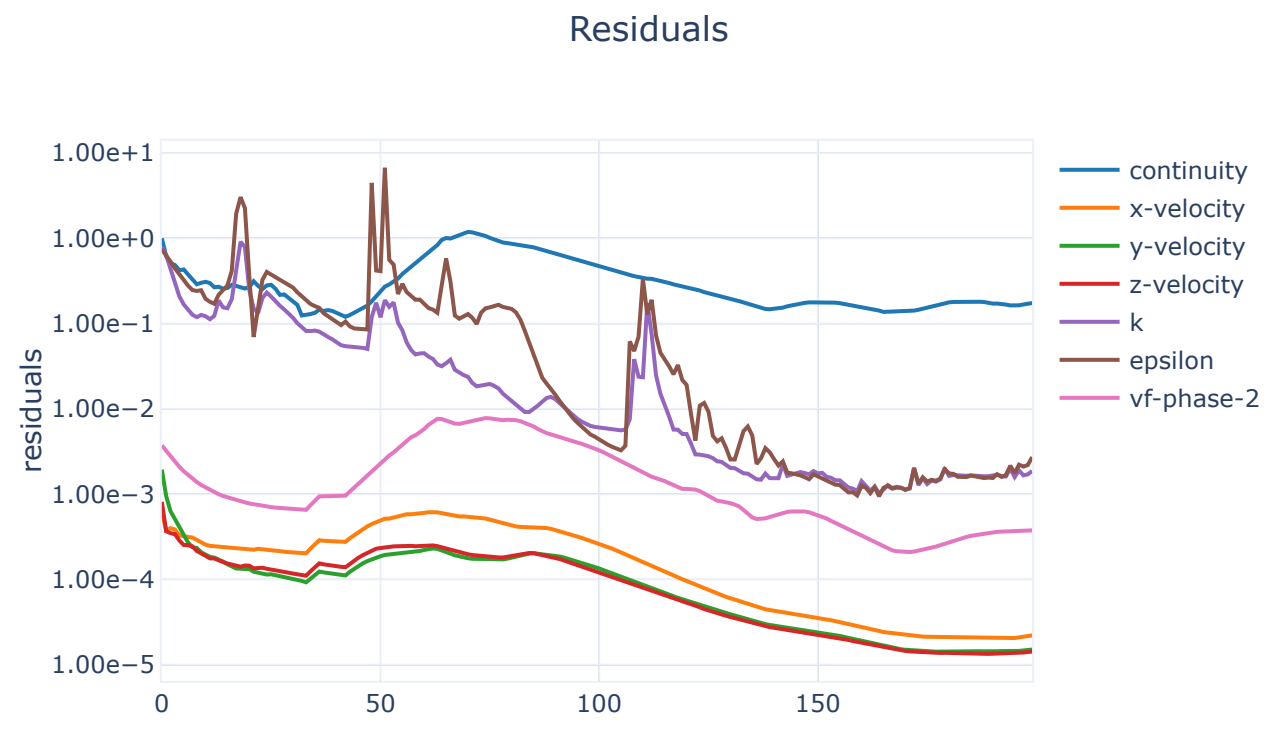
	Value	**Absolute Criteria**	**Convergence Status**
continuity	0.174032	0.001	Not Converged
x-velocity	2.206183e-05	0.001	Converged
y-velocity	1.504815e-05	0.001	Converged
z-velocity	1.424647e-05	0.001	Converged
k	0.001868646	0.001	Not Converged
epsilon	0.002722648	0.001	Not Converged
vf-phase-2	0.000376258	0.001	Converged

Report Definitions

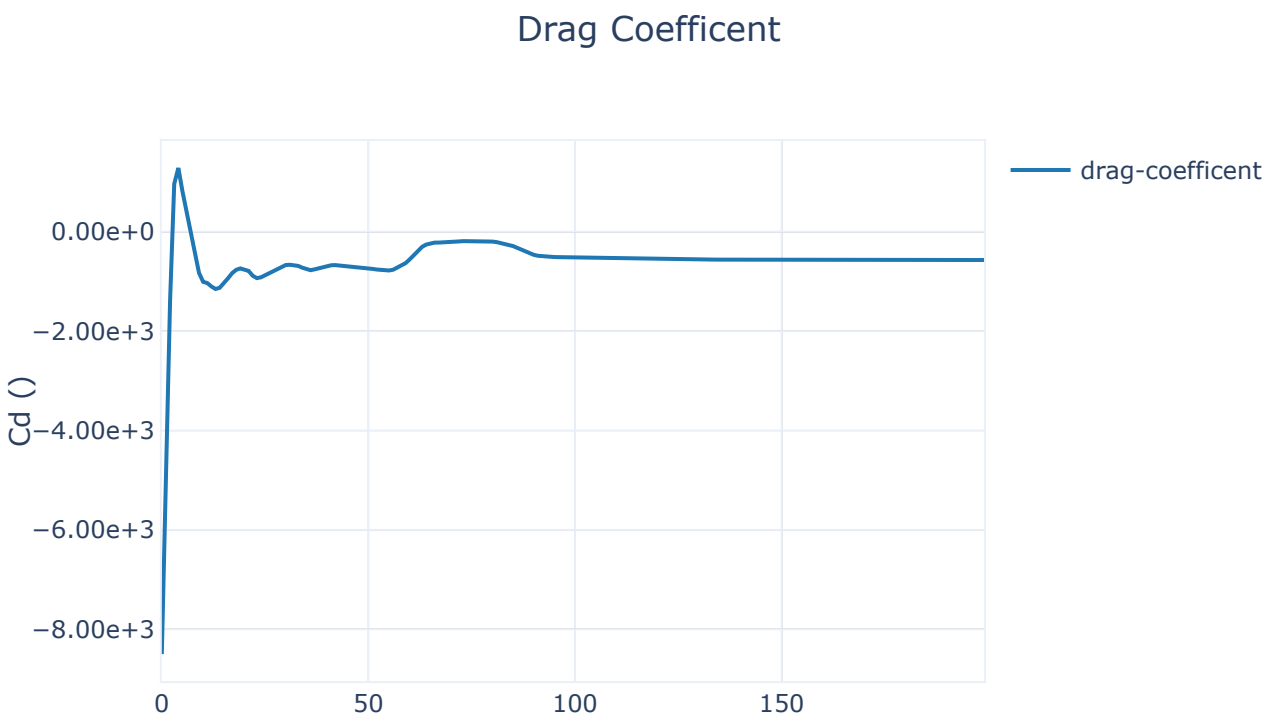
force	-348.6619	N
drag-coefficent	-569.2439	

Plots

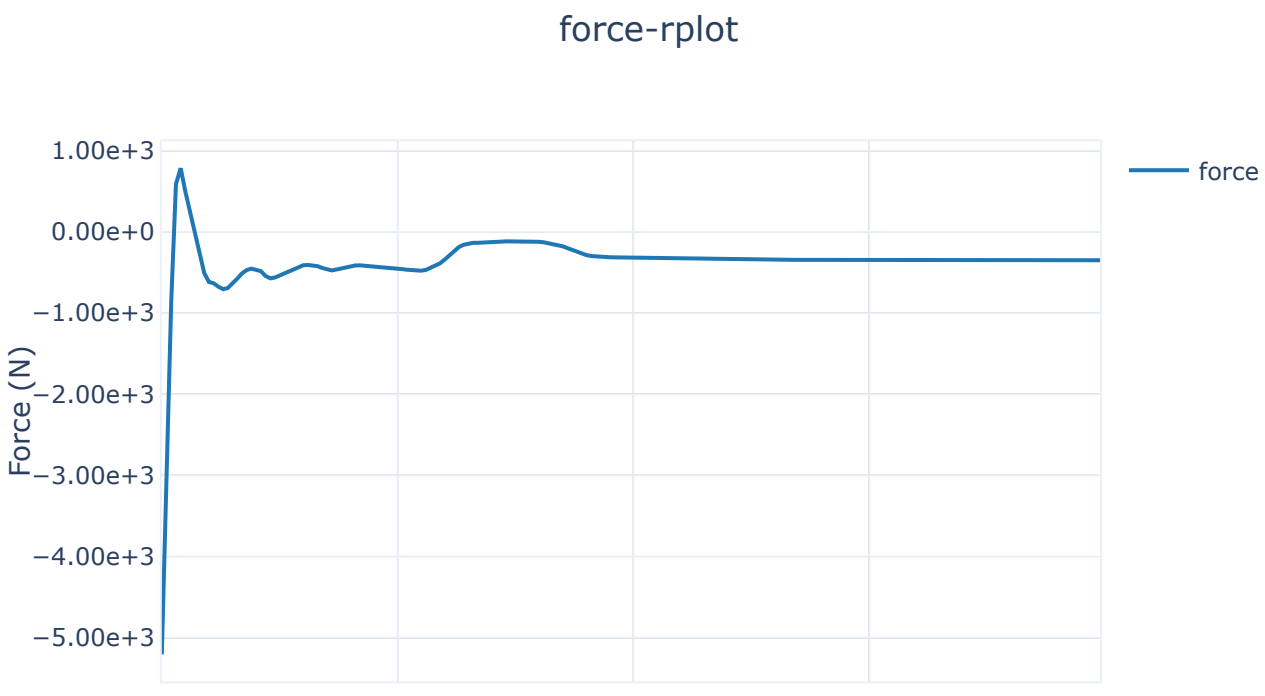
Residuals

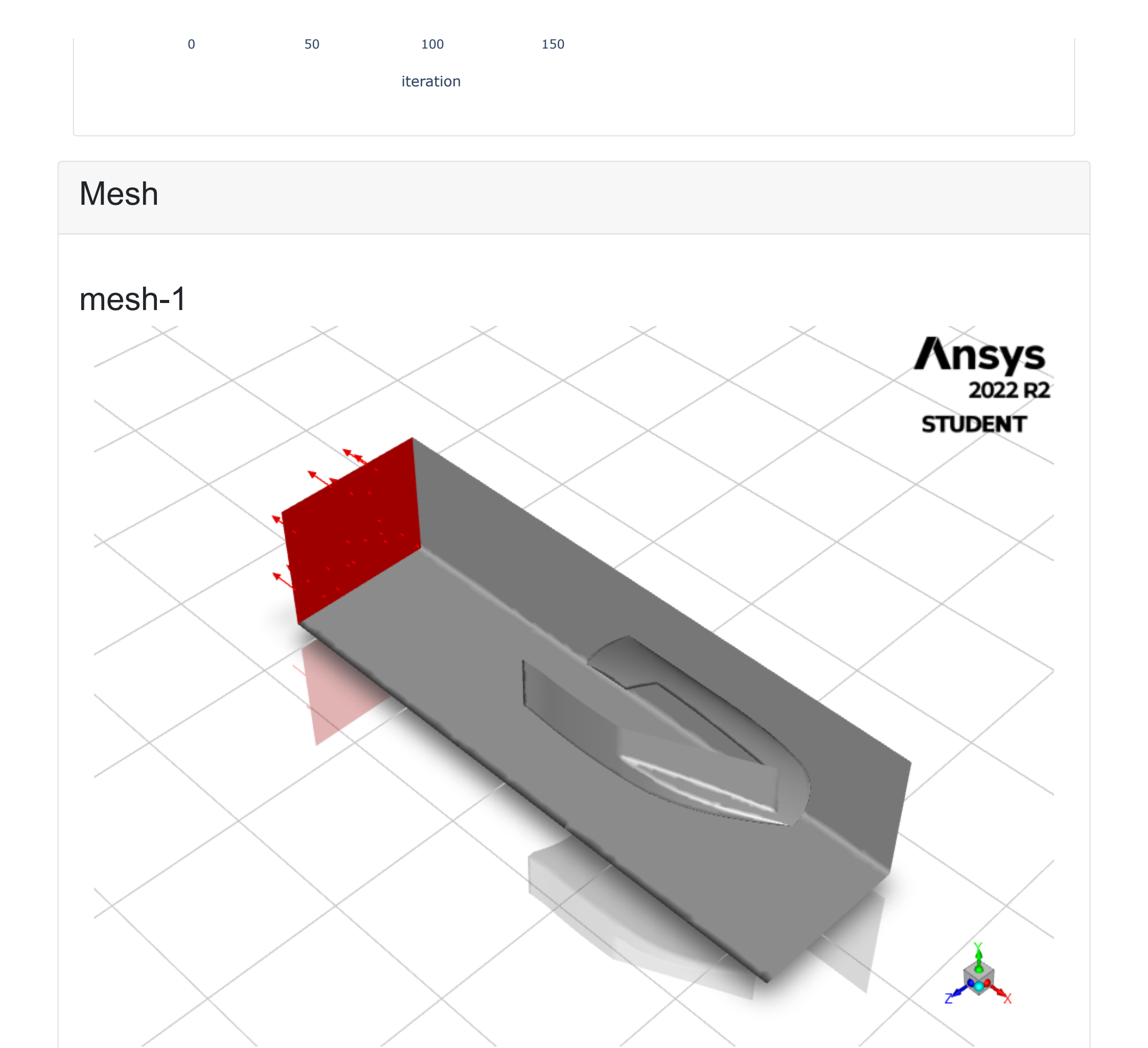


drag-coefficent



force



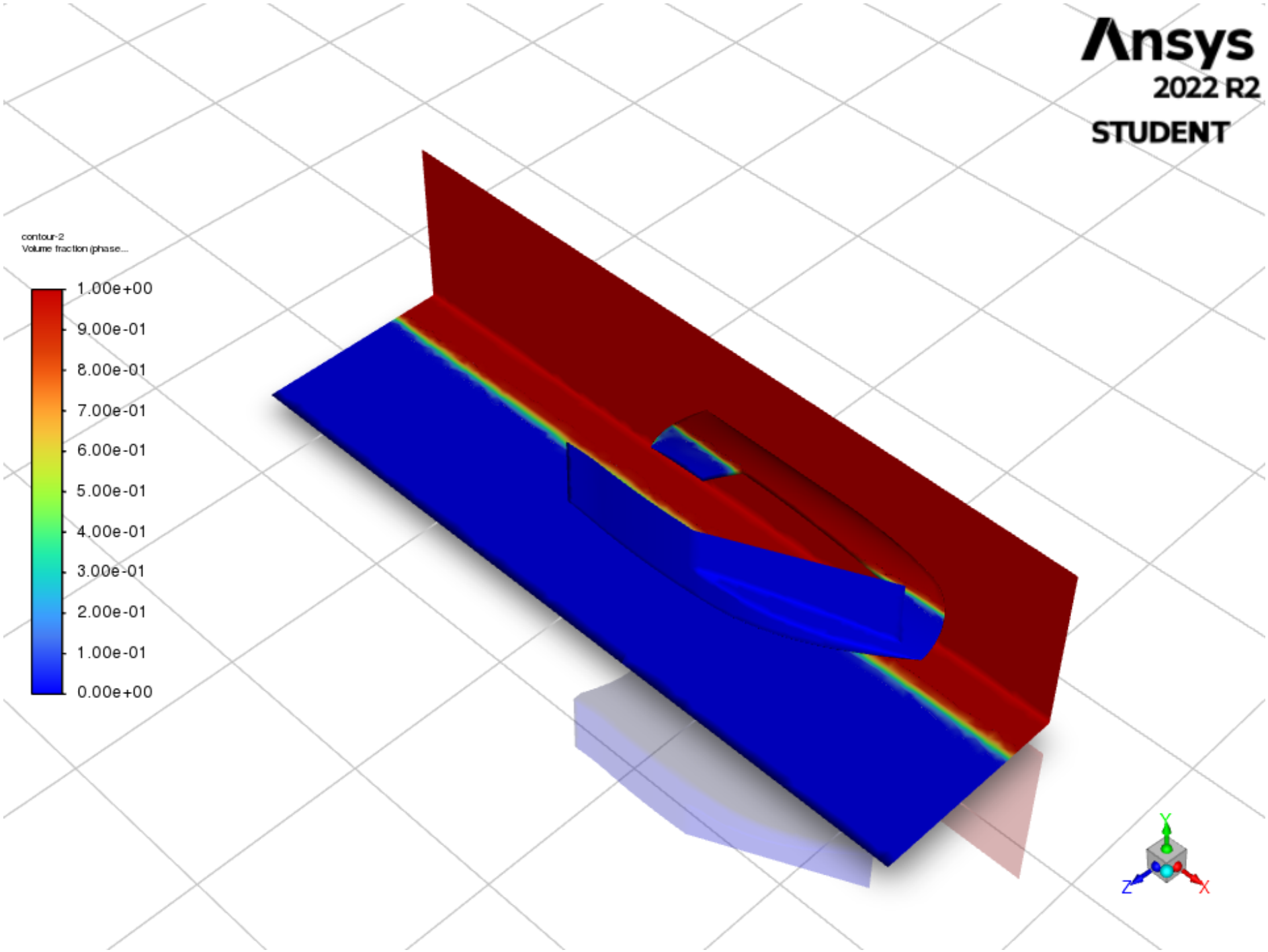


Mesh

mesh-1

Contours

contour-2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STUDENT
contour-2
Volume fraction (phase...
1.00e+00
9.00e-01
8.00e-01
7.00e-01
6.00e-01
5.00e-01
4.00e-01
3.00e-01
2.00e-01
1.00e-01
0.00e+00
Y
Z
X