ANSYS
2021 **R1**

40deg1

Analyst	temis
Date	5/19/2021 11:22 PM

Table of Contents

System Information

Application	Fluent
Settings	3d, density-based implicit, SST k-omega
Version	21.1.0-10179
Source Revision	49a2c352da
Build Time	Nov 20 2020 15:49:11 EST
CPU	Intel(R) Core(TM) i7-8550U
OS	Windows

Geometry and Mesh

Mesh Size

Cells	Faces	Nodes
425211	929467	123091

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
solid	Mixed Cell	0.10755987	238.69505

Orthogonal Quality
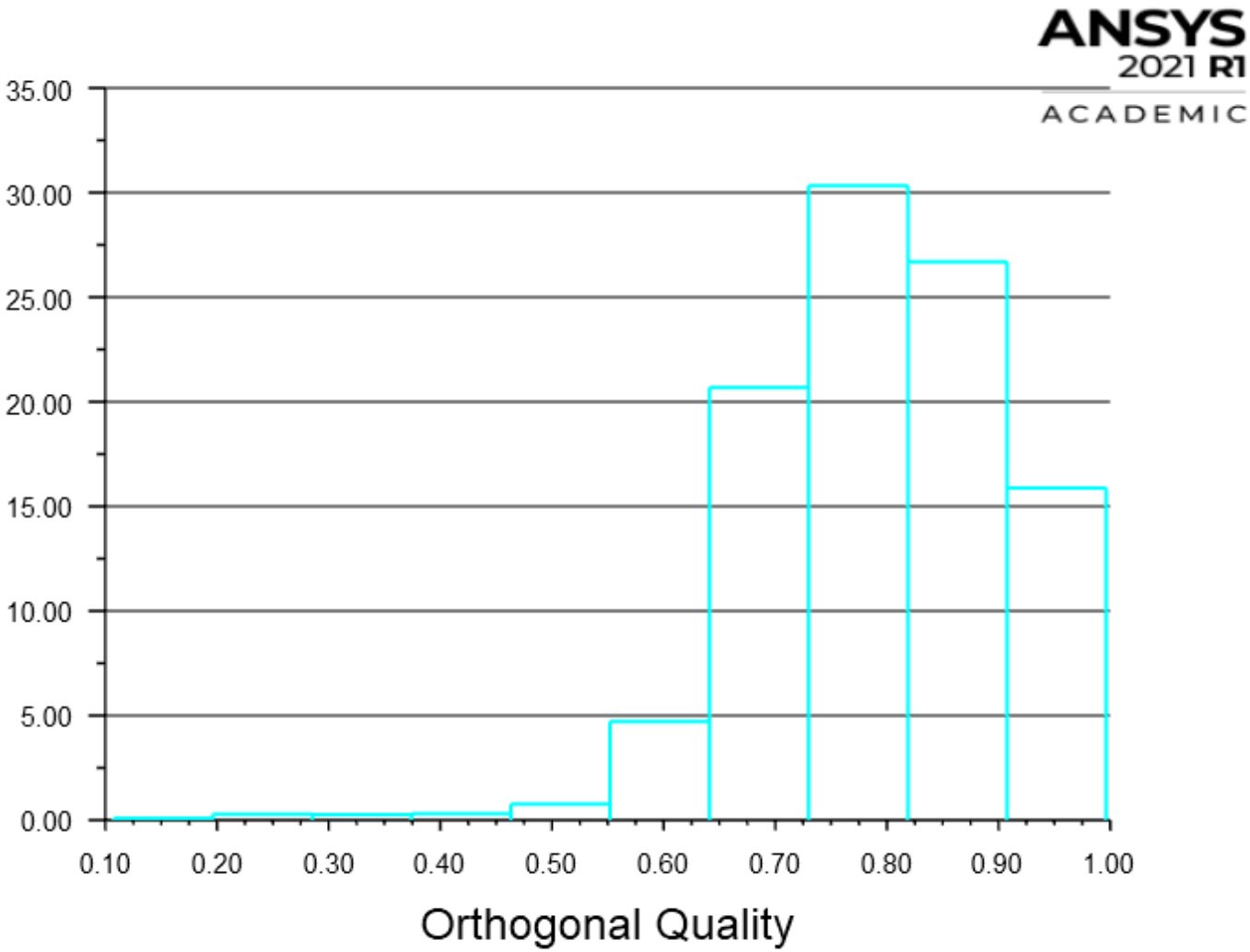
Simulation Setup

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)	kinetic theory
Thermal Conductivity	kinetic theory
Viscosity	kinetic theory
Molecular Weight	28.966 kg/kmol
L-J Characteristic Length	3.711 Angstrom
L-J Energy Parameter	-194.55 C
Thermal Expansion Coefficient	0
Degrees of Freedom	5
Speed of Sound	none
− 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	
▬ inlet	
Gauge Pressure [Pa]	1951
Mach Number	10
Temperature [C]	-215
Coordinate System	Cartesian (X, Y, Z)
Component of Flow Direction (x,y,z)	(0.7660444, 0.6427876, 0)
Turbulent Specification Method	Intensity and Length Scale
Turbulent Intensity [%]	0.01
Turbulent Length Scale [m]	0.001
▬ Outlet	
▬ outlet	
Backflow Reference Frame	Absolute
Gauge Pressure [Pa]	1951
Pressure Profile Multiplier	1
Backflow Total Temperature [C]	26.85
Backflow Direction Specification Method	Normal to Boundary
Turbulent Specification Method	Intensity and Length Scale
Backflow Turbulent Intensity [%]	0.01
Backflow Turbulent Length Scale [m]	0.001
Acoustic Wave Model	Off
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	
symmetry	symmetry
− Wall	
− capsula	
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
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	7.6 m^2
Density	0.1168857 kg/m^3
Enthalpy	927291.7 J/kg
Length	1 m
Pressure	1950.999 Pa
Temperature	58.15008 C
Velocity	1528.664 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
− Under-Relaxation Factors	
Turbulent Kinetic Energy	0.8
Specific Dissipation Rate	0.8
Turbulent Viscosity	1
Solid	1
− Discretization Scheme	
Flow	Second Order Upwind
Turbulent Kinetic Energy	Second Order Upwind
Specific Dissipation Rate	Second Order Upwind
− Time Marching	
Solver	Implicit
Courant Number	1
− Solution Limits	
Minimum Absolute Pressure [Pa]	1
Maximum Absolute Pressure [Pa]	5e+10
Minimum Temperature [C]	1
Maximum Temperature [C]	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	3
Case Read	11.145 seconds
Data Read	1.258 seconds
Iteration	7659.4 seconds

AMG	3141.9 seconds
Virtual Current Memory	1.1137 GB
Virtual Peak Memory	1.39461 GB
Memory Per M Cell	2.38004

Report Definitions

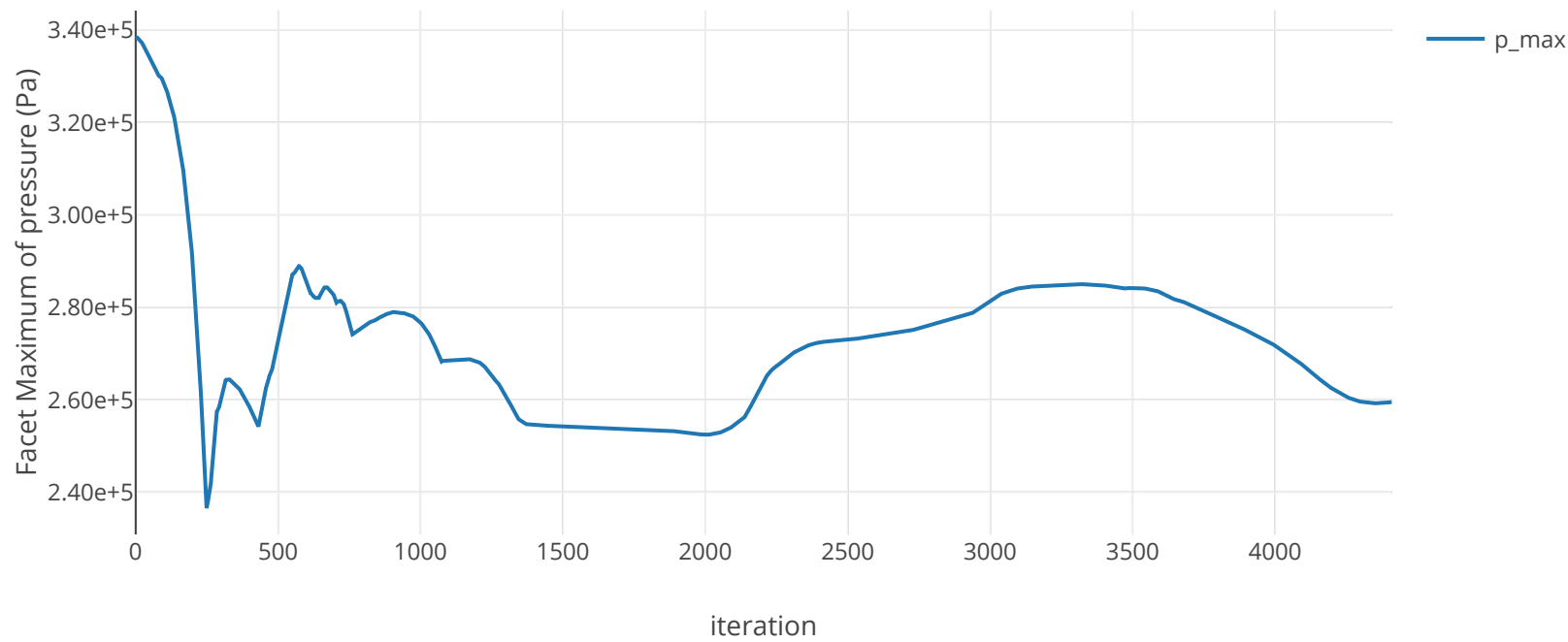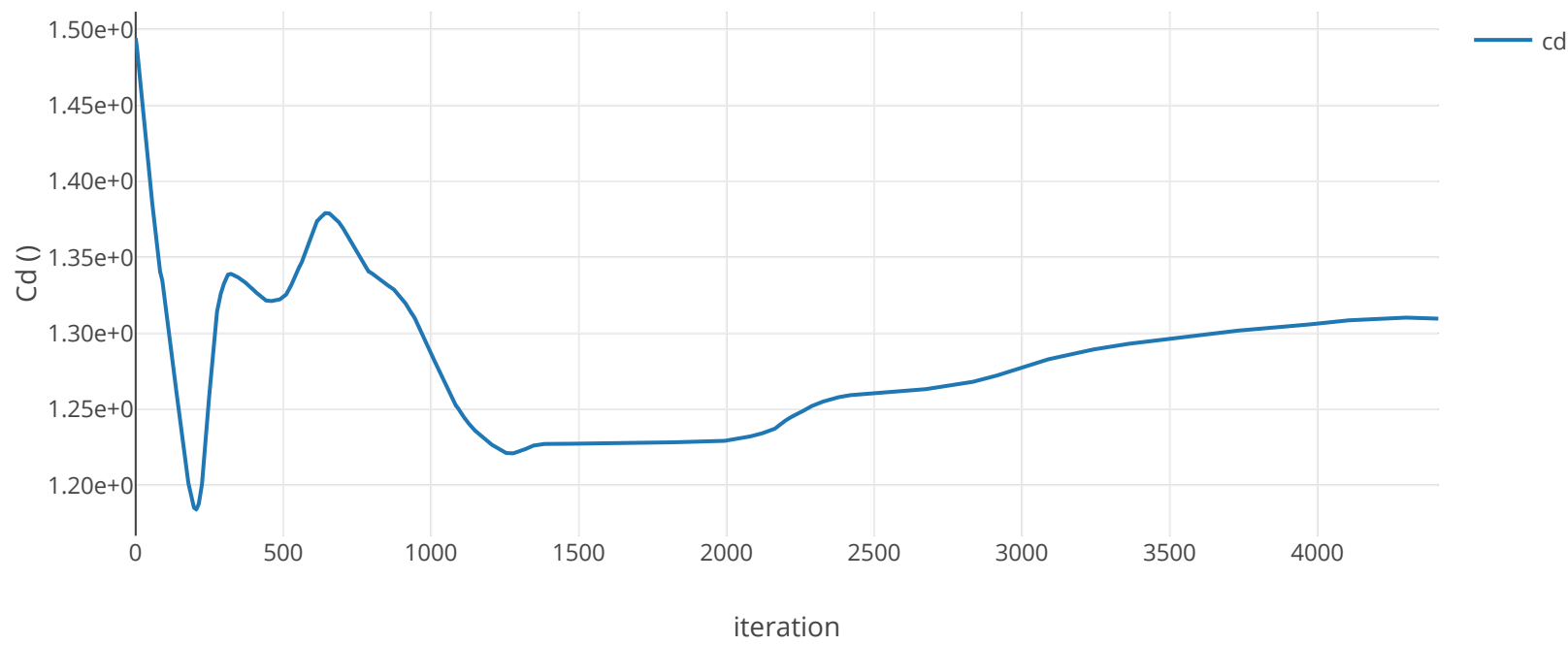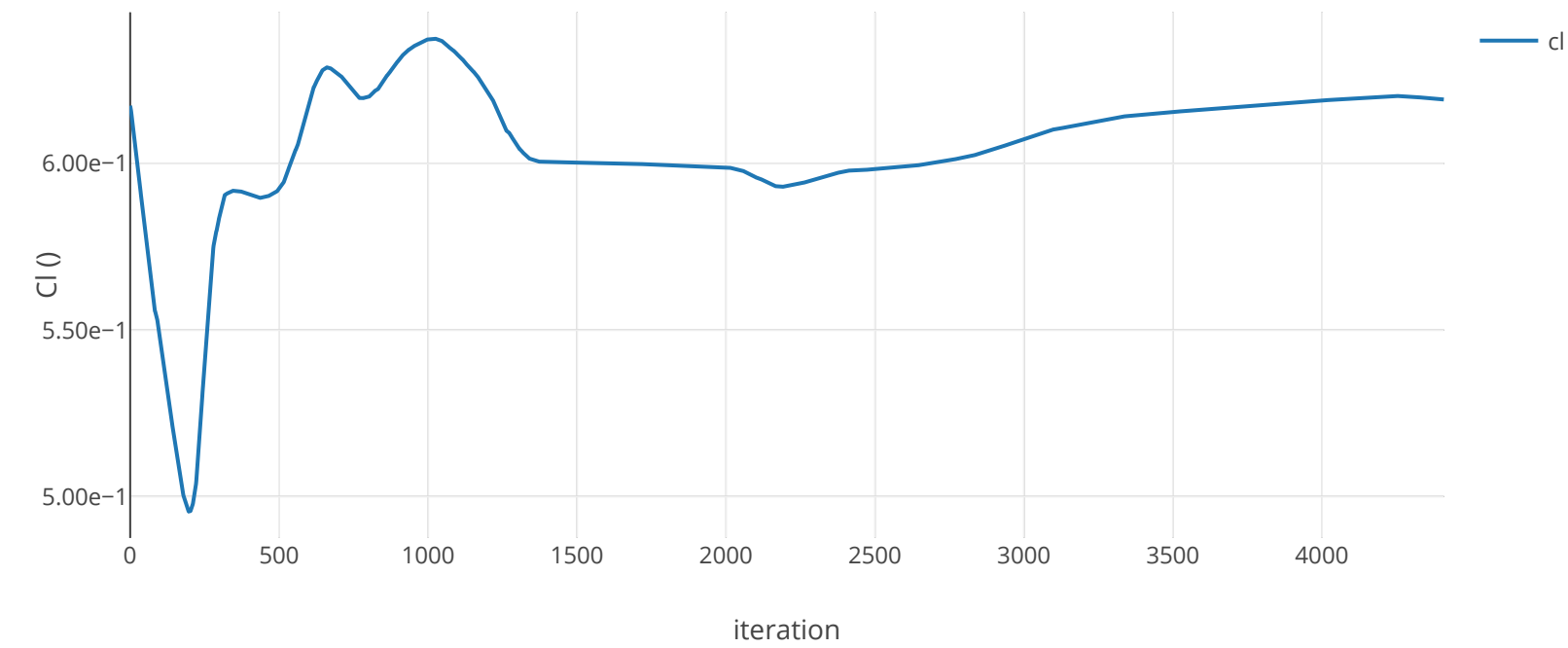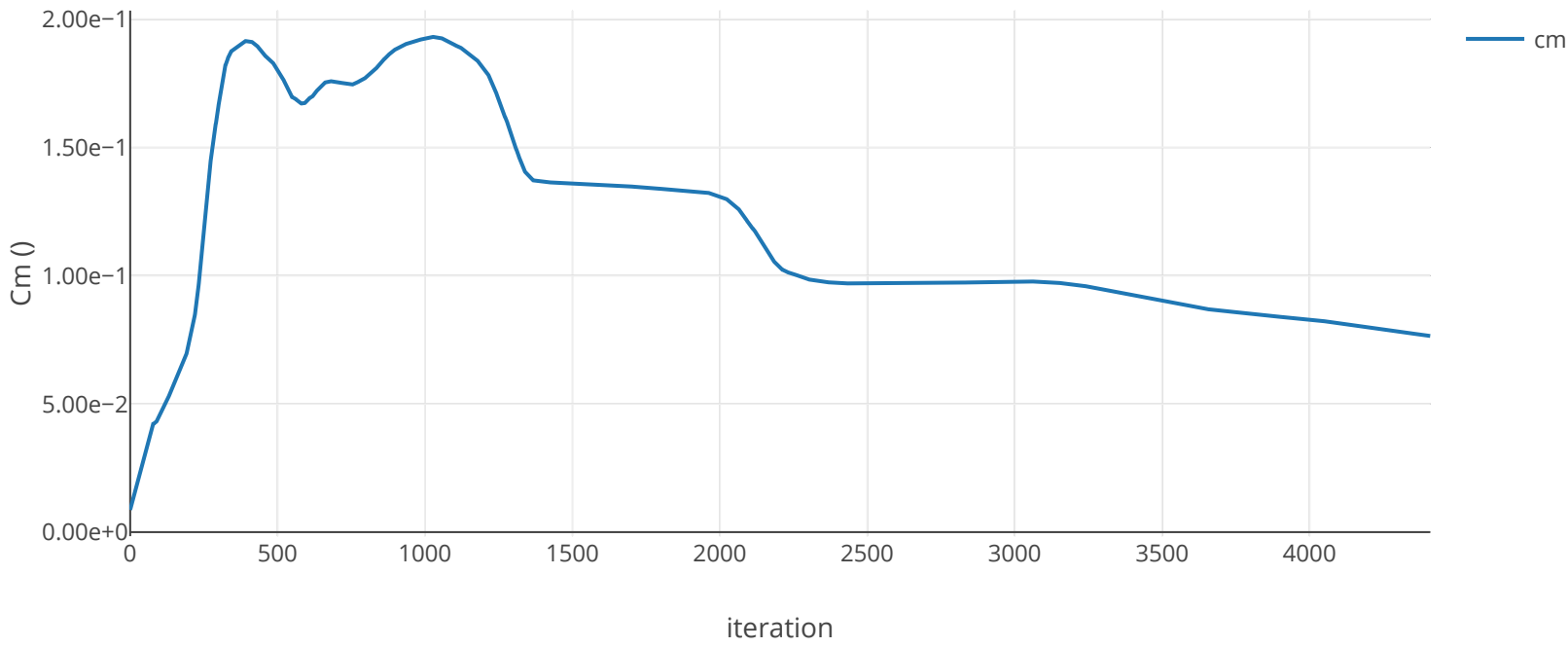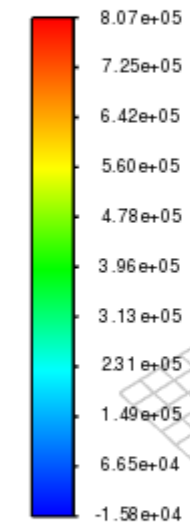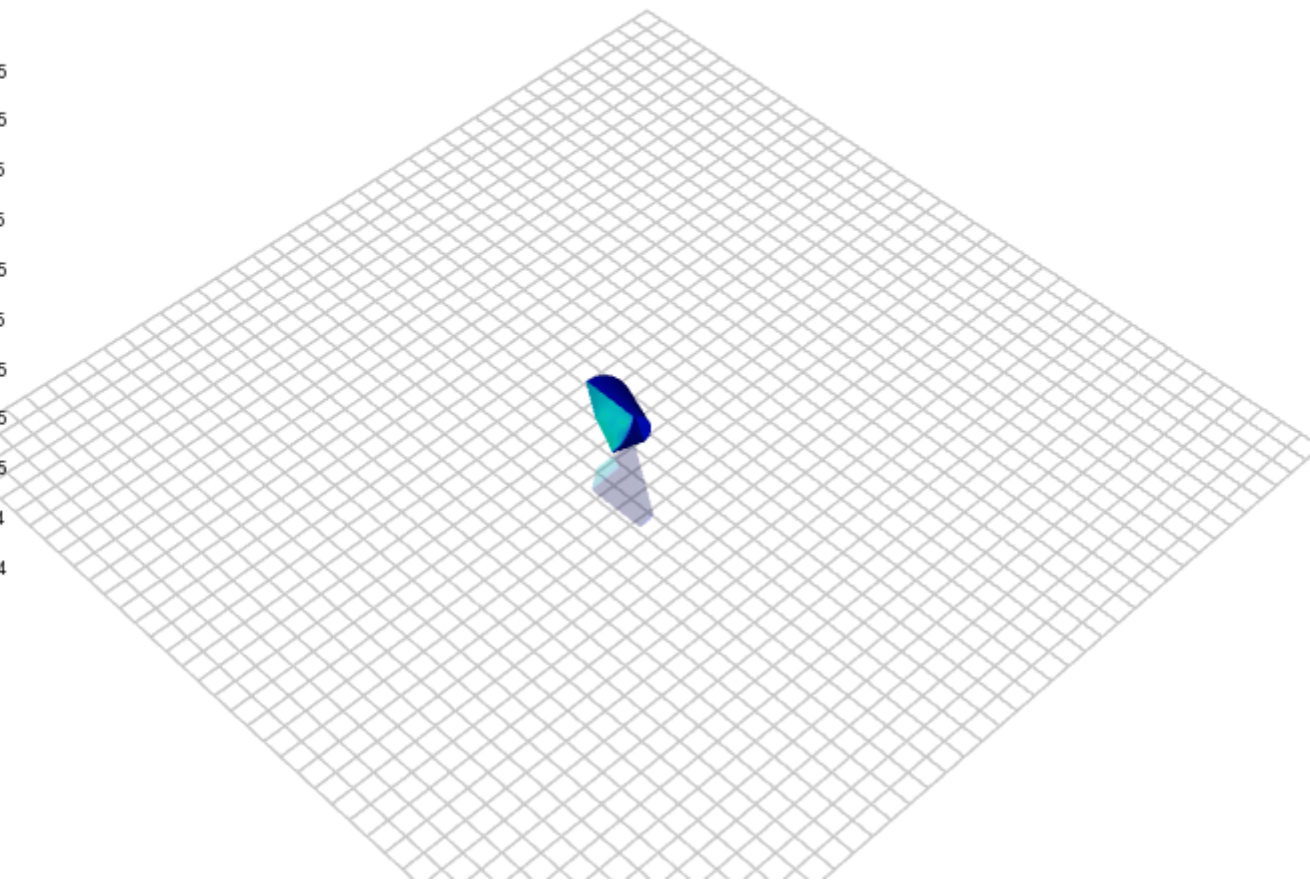|	
t_max	2617.871 C
p_max	259479.8 Pa
cl	0.6192281
cm	0.07648789
cd	1.309625

Plots

Residuals
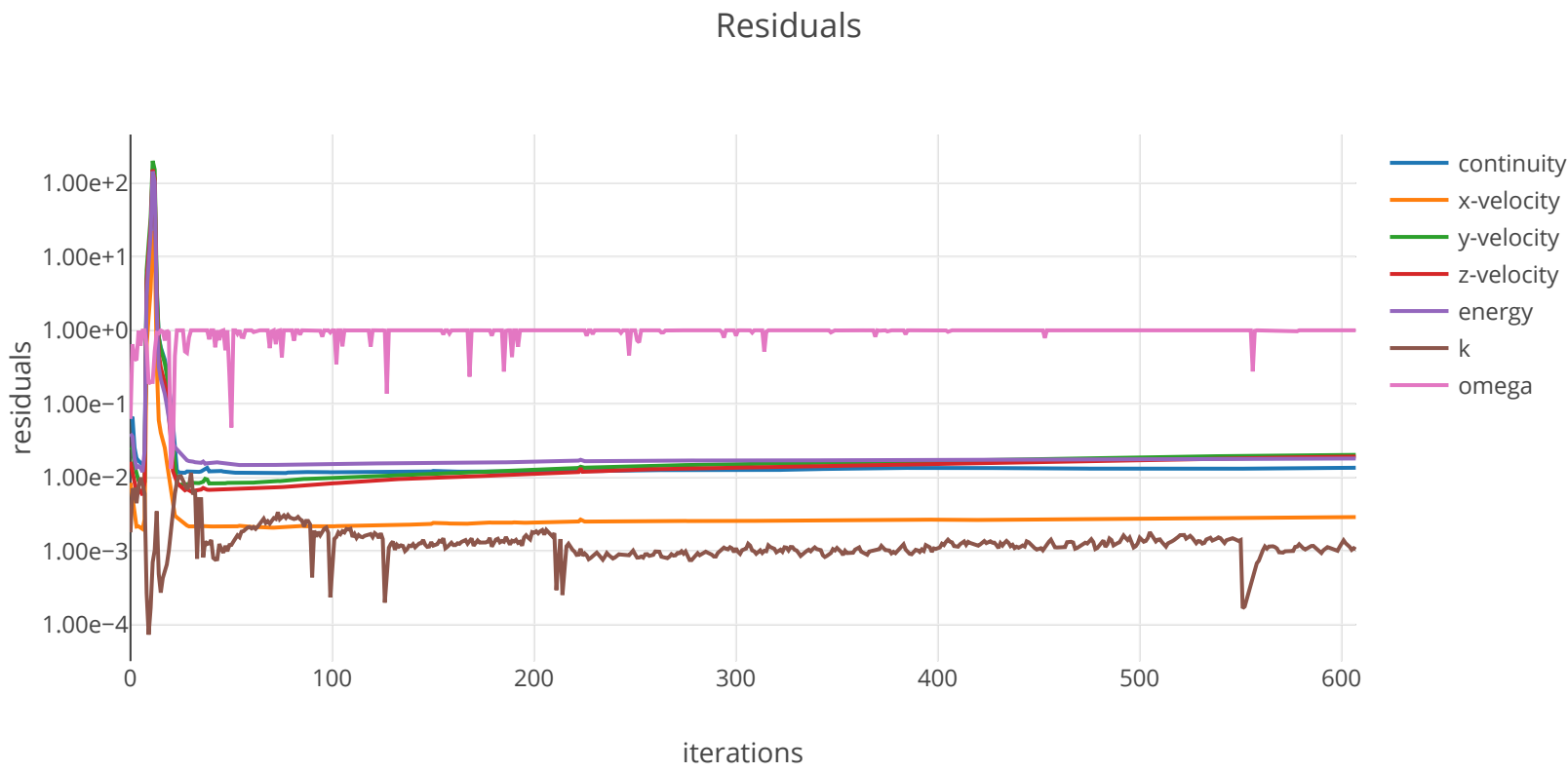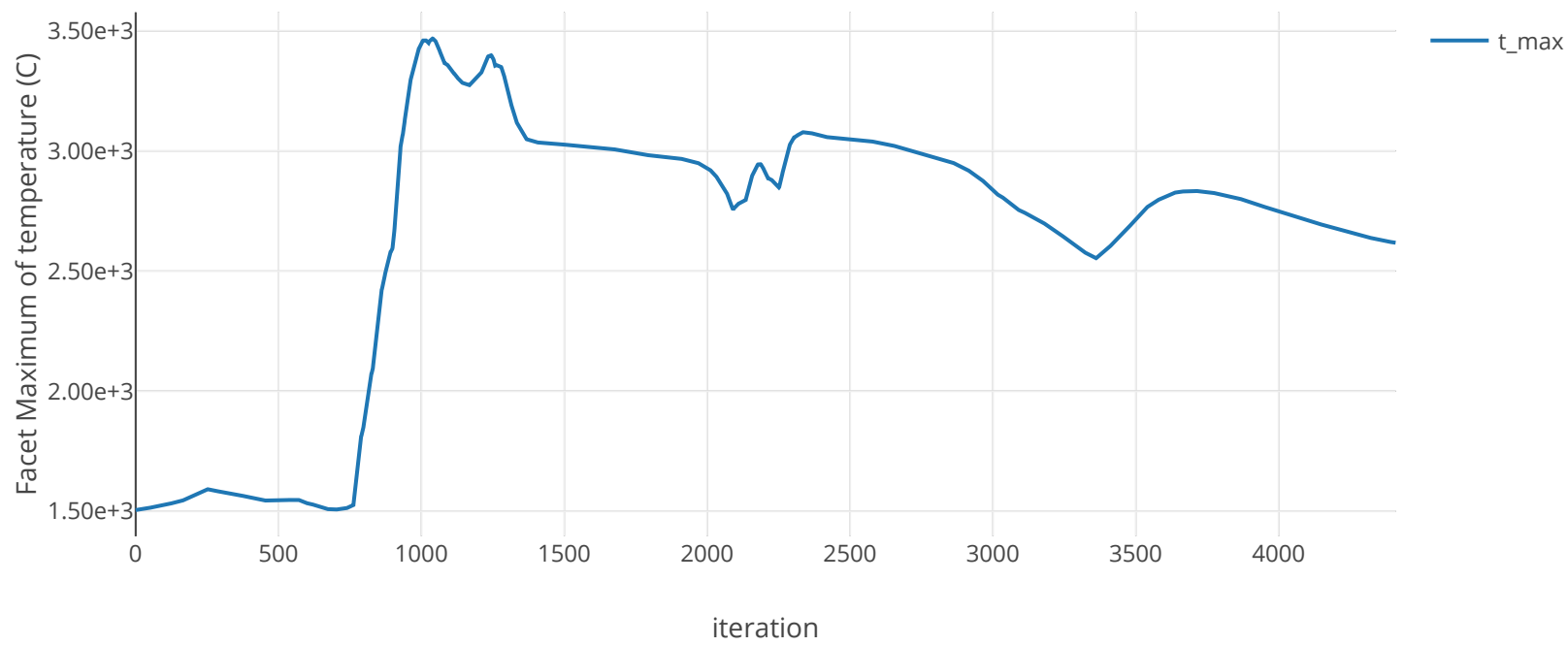
t_max-rplot

p_max-rplot

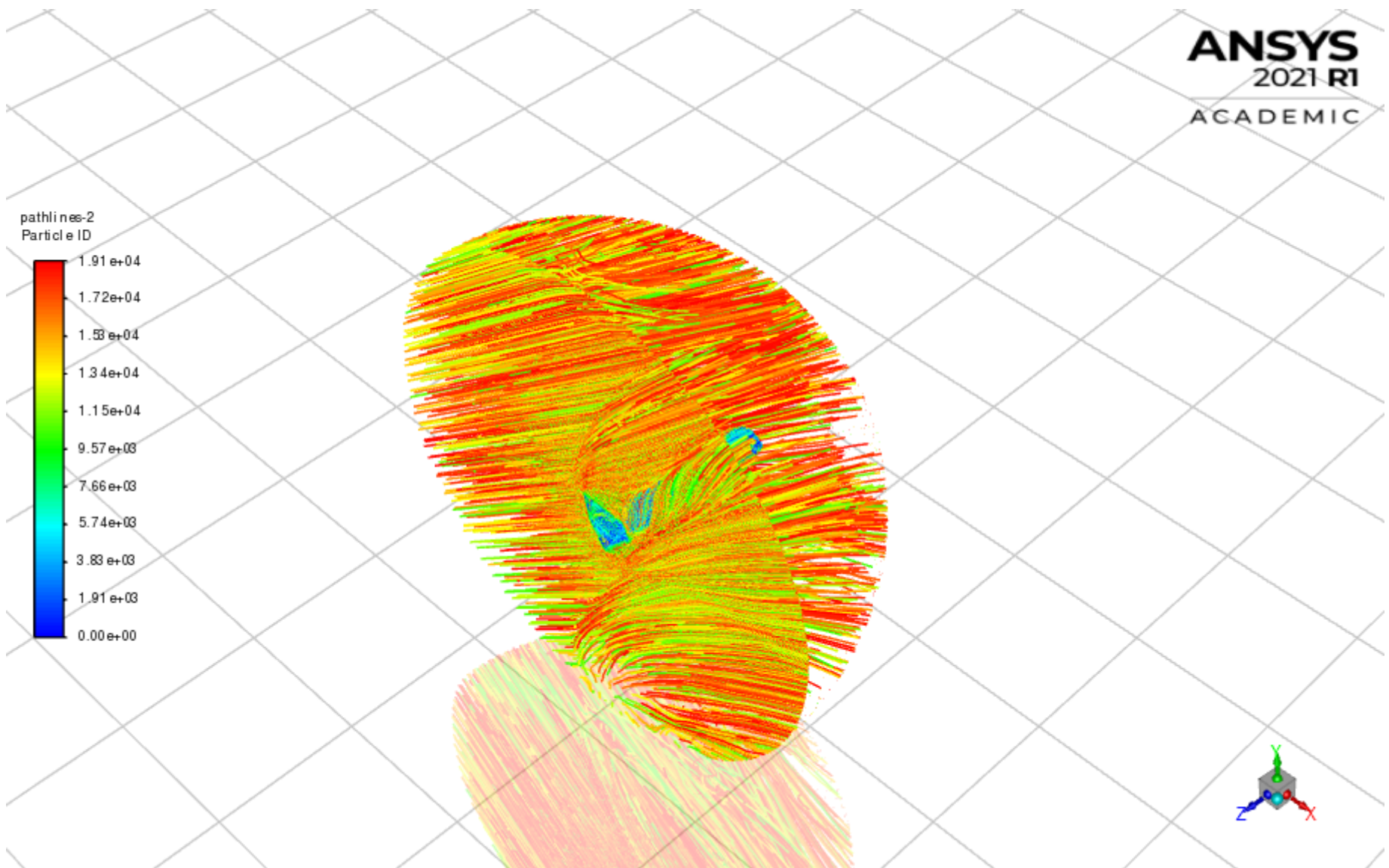cd-rplot

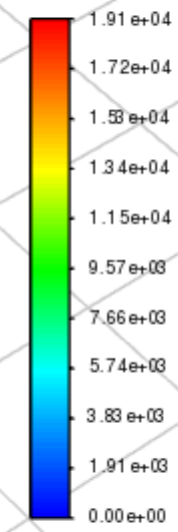## cl-rplot

cm-rplot

Contours

contour-1
Static Pressure

8.07e+05
7.25e+05
6.42e+05
5.60e+05
4.78e+05
3.96e+05
3.13e+05
2.31e+05
1.49e+05
6.65e+04
-1.58e+04

[Pa]

Pathlines

pathlines-2
Particle ID

1.91e+04
1.72e+04
1.53e+04
1.34e+04
1.15e+04
9.57e+03
7.66e+03
5.74e+03
3.83e+03
1.91e+03
0.00e+00
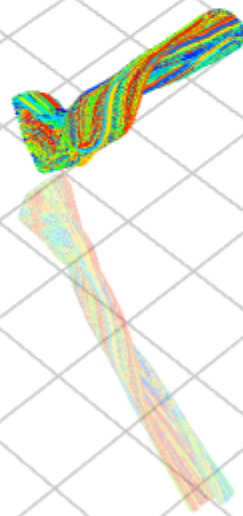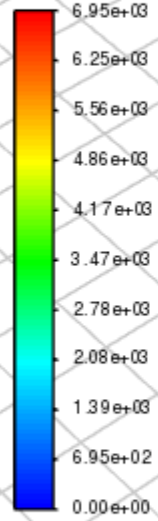
XY Plots

Static Pressure