ANSYS 2021 R1

Ansys Fluent Simulation Report

Analyst	diego
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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) i7-7700HQ
OS	Windows

Geometry and Mesh

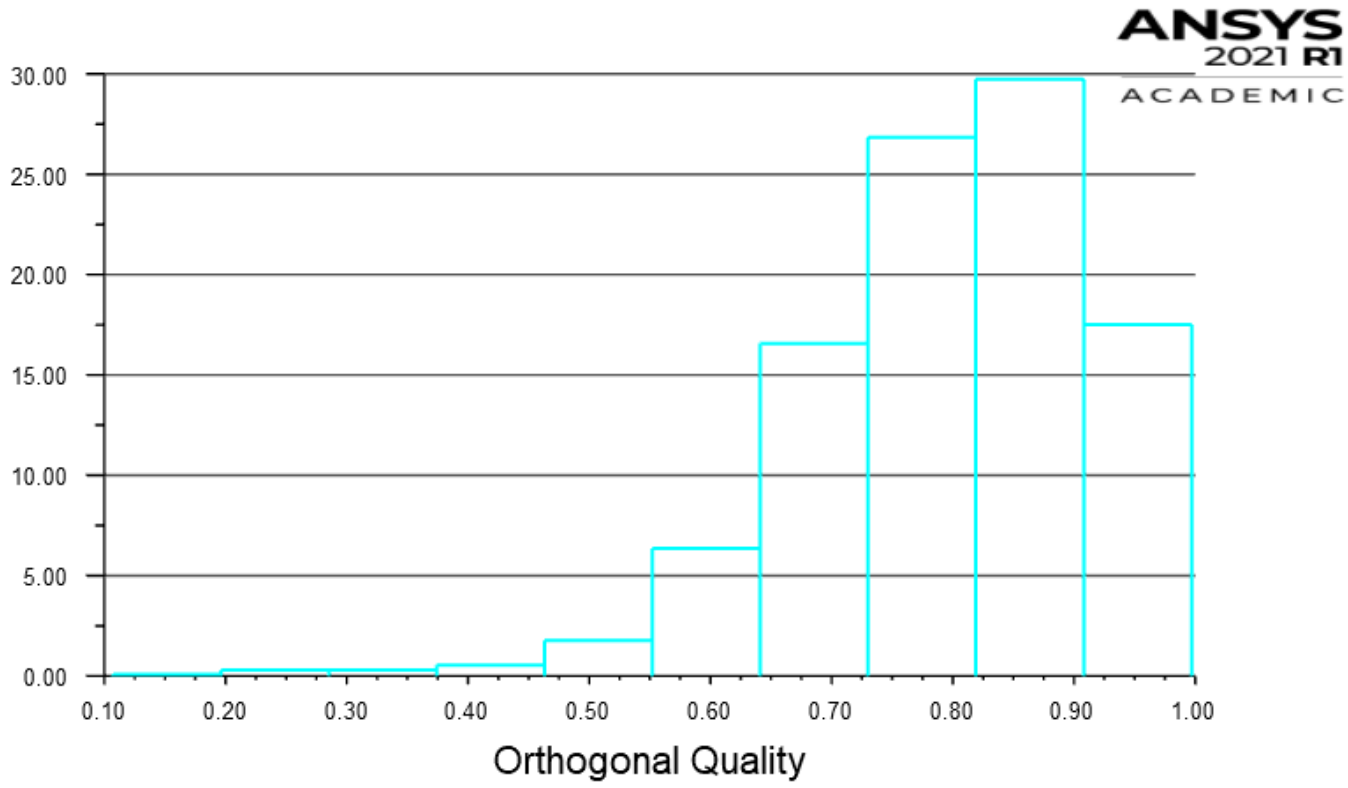
Mesh Size

Cells	Faces	Nodes
430133	939919	124260

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
solid	Mixed Cell	0.10721304	239.43277

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	8
Temperature [C]	-215
Coordinate System	Cartesian (X, Y, Z)
Component of Flow Direction (x,y,z)	(1, 0, 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]	-215
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	0.1168859 kg/m^3
Enthalpy	806200.3 J/kg
Length	3.74 m
Pressure	1951.001 Pa
Temperature	58.15008 C
Velocity	1222.933 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

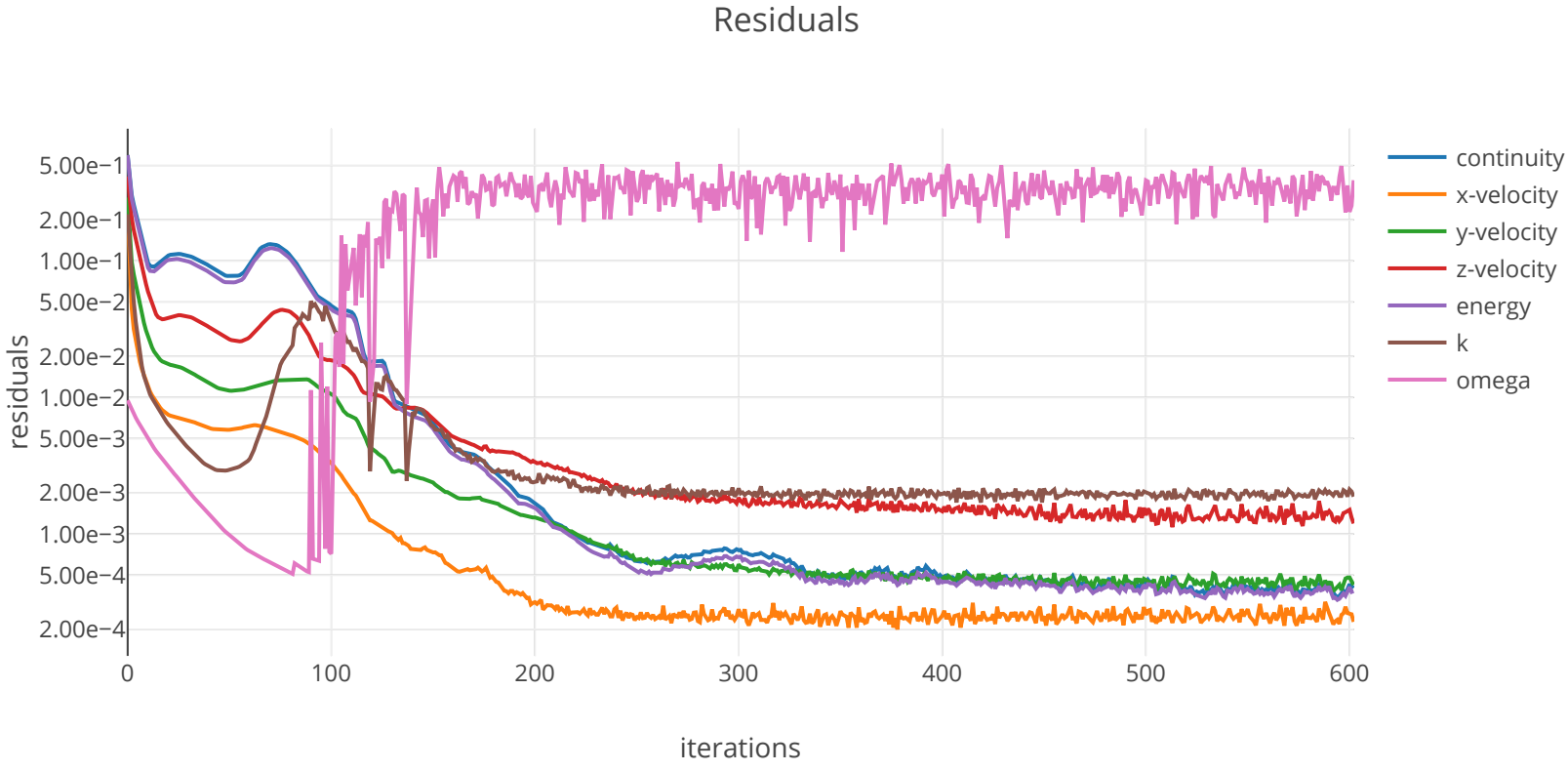
Run Information

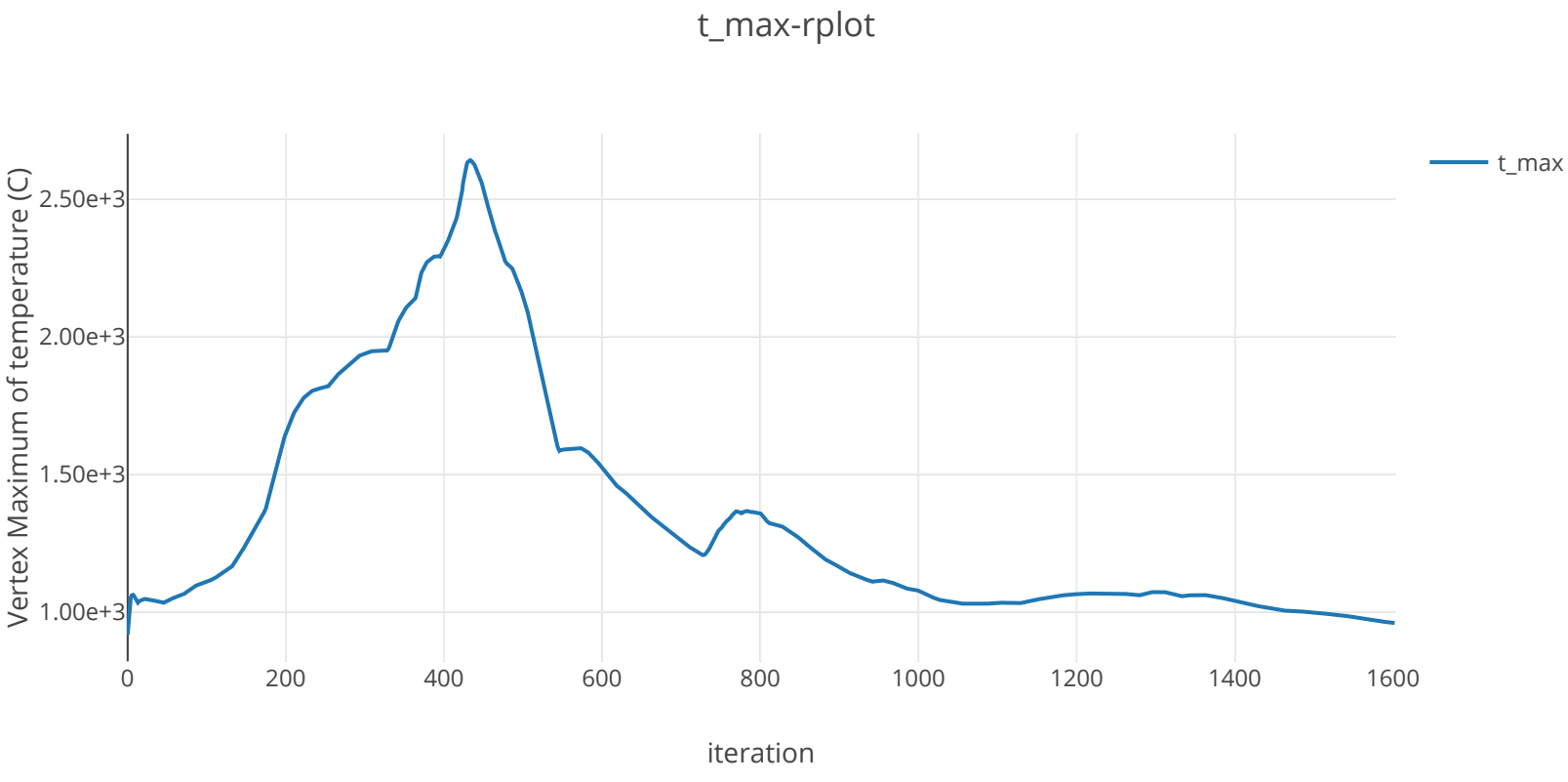
Number of Machines	1
Number of Cores	4
Case Read	15.93 seconds
Iteration	2231.72 seconds
AMG	915.603 seconds
Virtual Current Memory	1.26453 GB
Virtual Peak Memory	1.51935 GB
Memory Per M Cell	2.64369

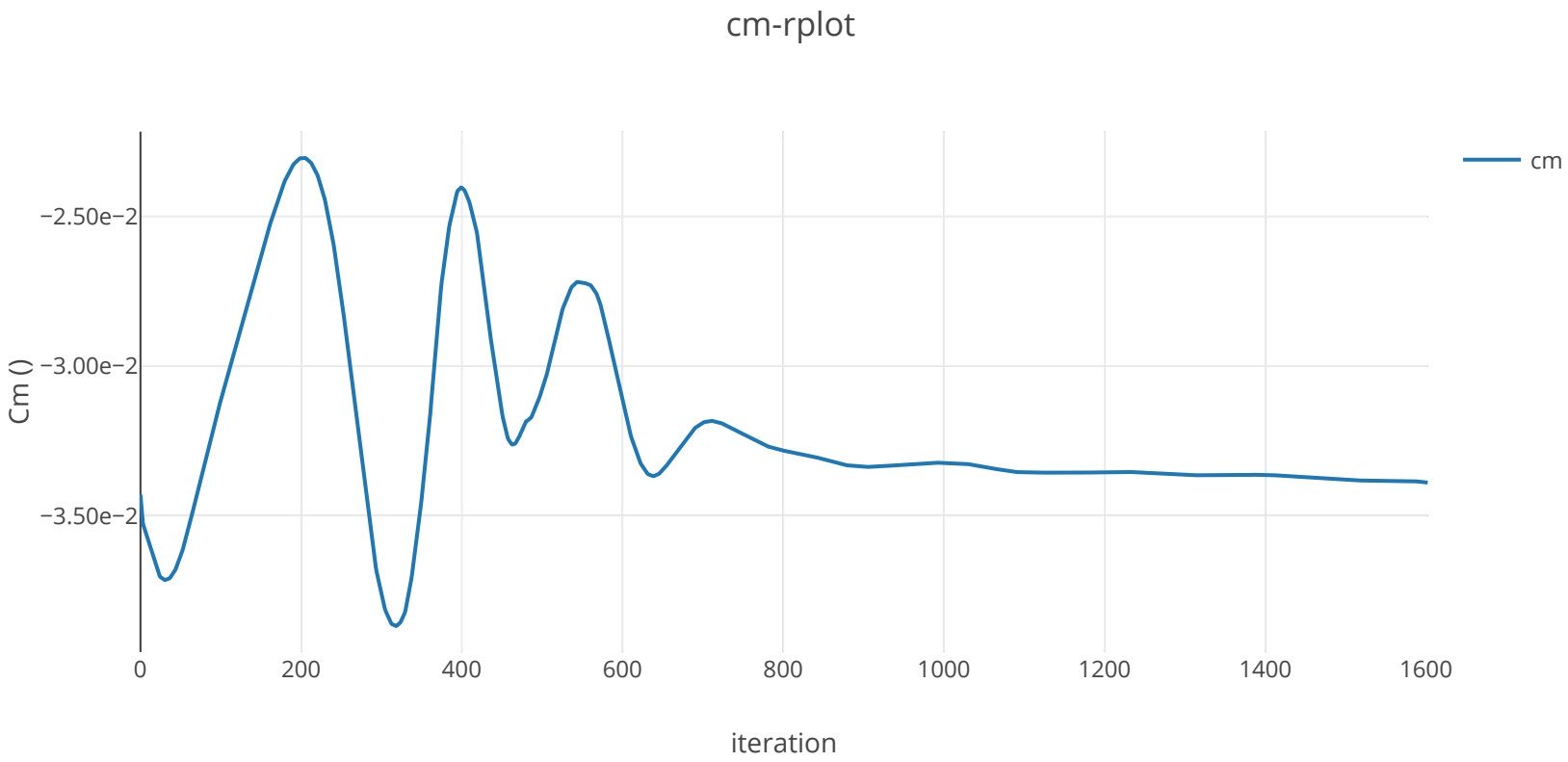
Report Definitions

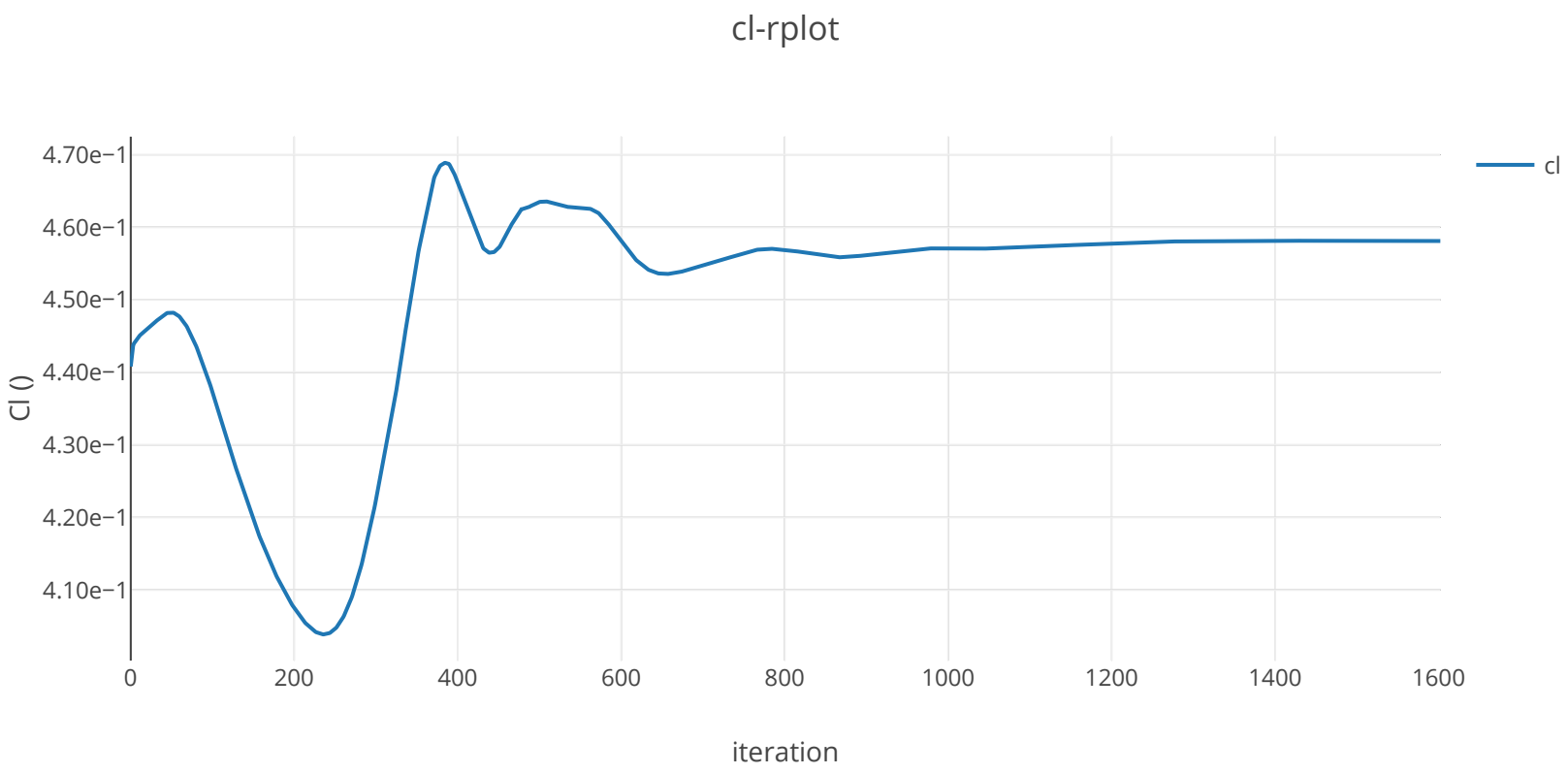
t_max	959.8036 C
cm	-0.03389358
cl	0.4581038
cd	1.405749

Plots






cm-rplot
cm
−2.50e−2
−3.00e−2
−3.50e−2
Cm ()
0
200
400
600
800
1000
1200
1400
1600
iteration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4.70e−1
4.60e−1
4.50e−1
4.40e−1
4.30e−1
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4.10e−1
Cl ()
0
200
400
600
800
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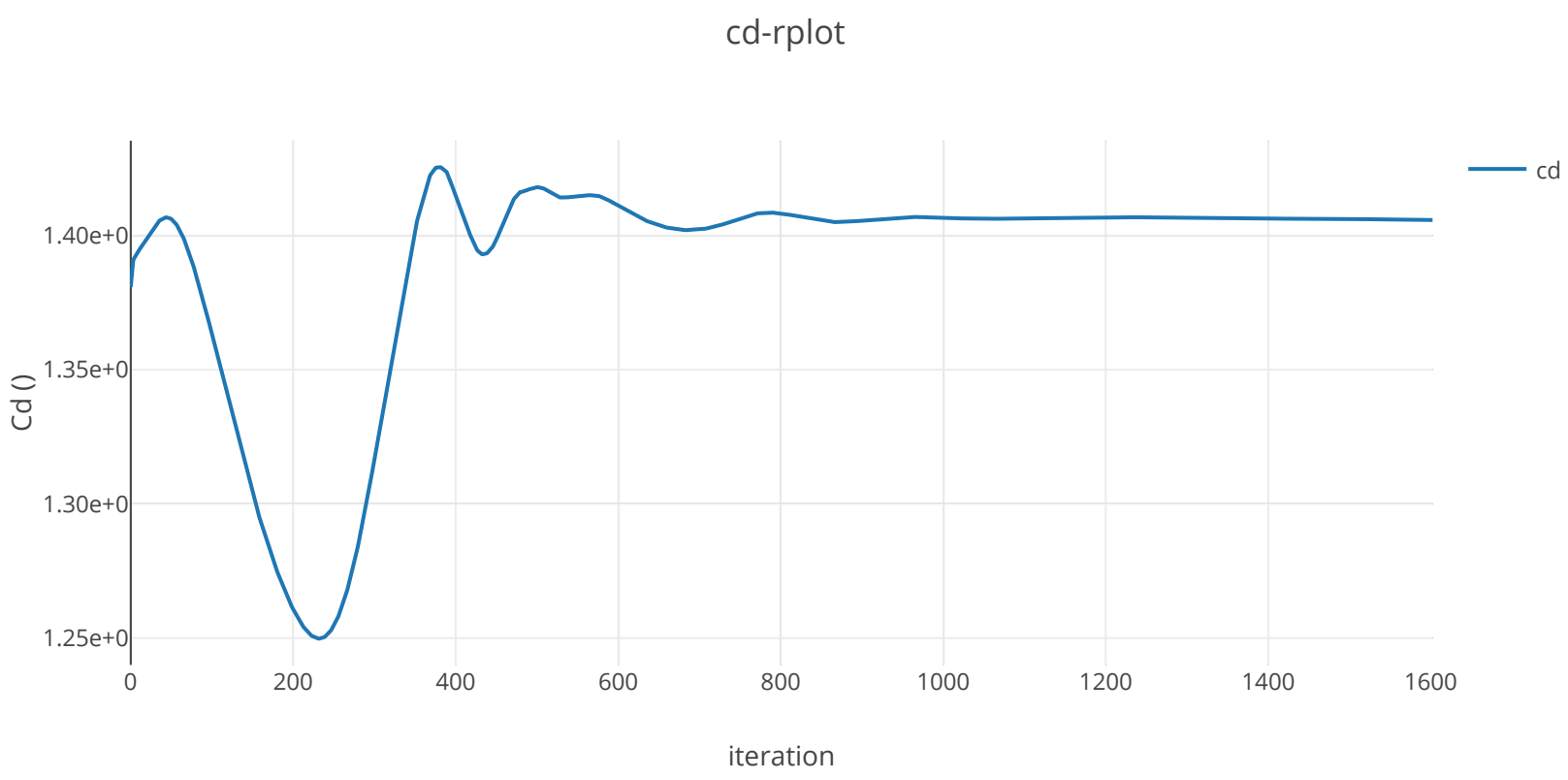
1200
1400
1600
iteration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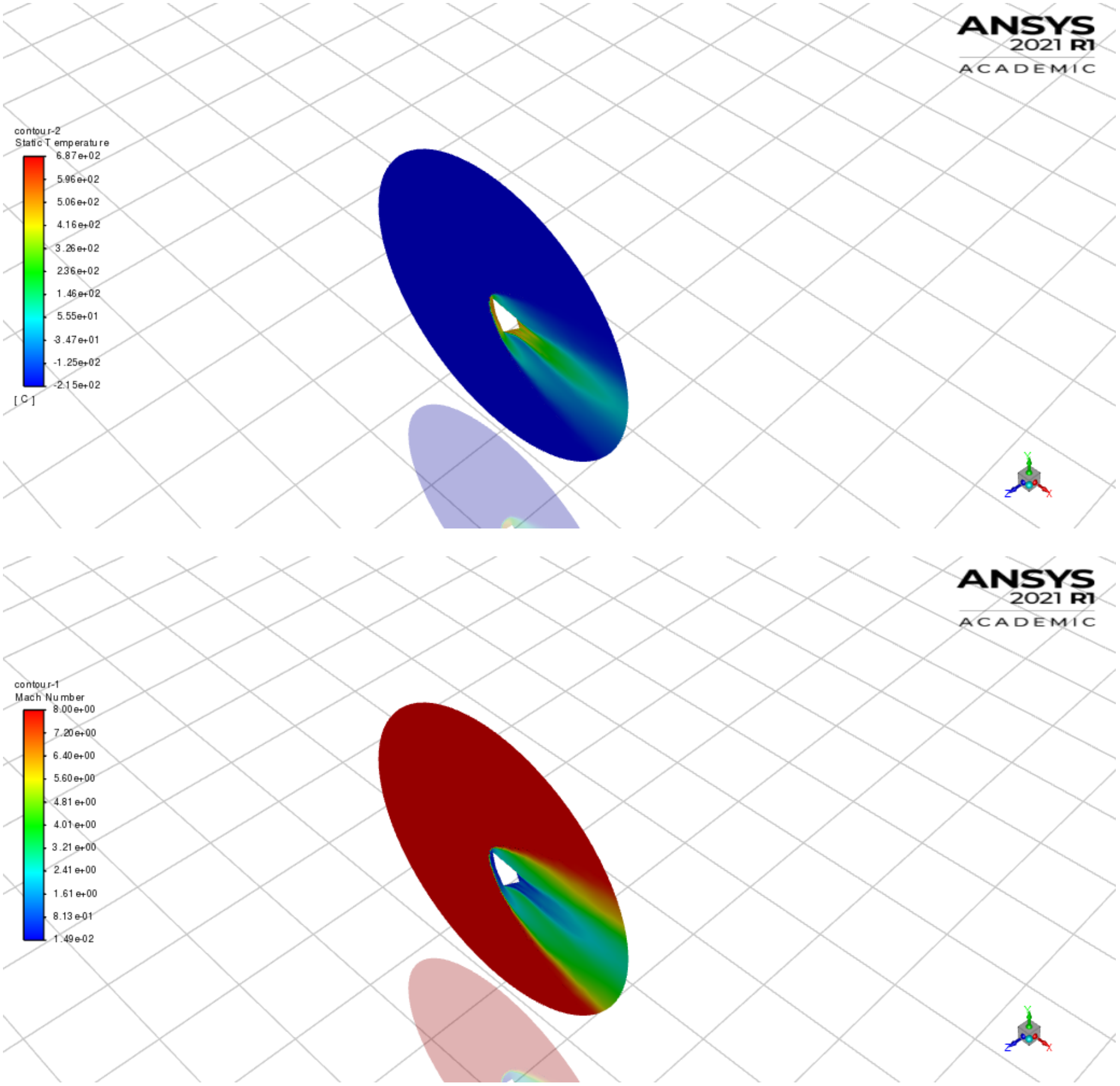
1.35e+0
1.30e+0
1.25e+0
Cd ()
0
200
400
600
800
1000
1200
1400
1600
iteration

Contours


ANSYS
2021 R1
ACADEMIC
contour-2
Static Temperature
6.87e+02
5.96e+02
5.06e+02
4.16e+02
3.26e+02
2.36e+02
1.46e+02
5.55e+01
-3.47e+01
-1.25e+02
-2.15e+02
[C]
ANSYS
2021 R1
ACADEMIC
contour-1
Mach Number
8.00e+00
7.20e+00
6.40e+00
5.60e+00
4.81e+00
4.01e+00
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8.13e-01
1.49e-02