Ansys
2021 R2

Ansys Fluent Simulation Report

Analyst	prati
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Table of Contents

System Information

Application	Fluent
Settings	2d, double precision, pressure-based, SST k-omega
Version	21.2.0-10201
Source Revision	fcb749f05e
Build Time	May 28 2021 13:54:44 EDT
CPU	AMD Ryzen 5 5500U with Radeon Graphics
OS	Windows

Geometry and Mesh

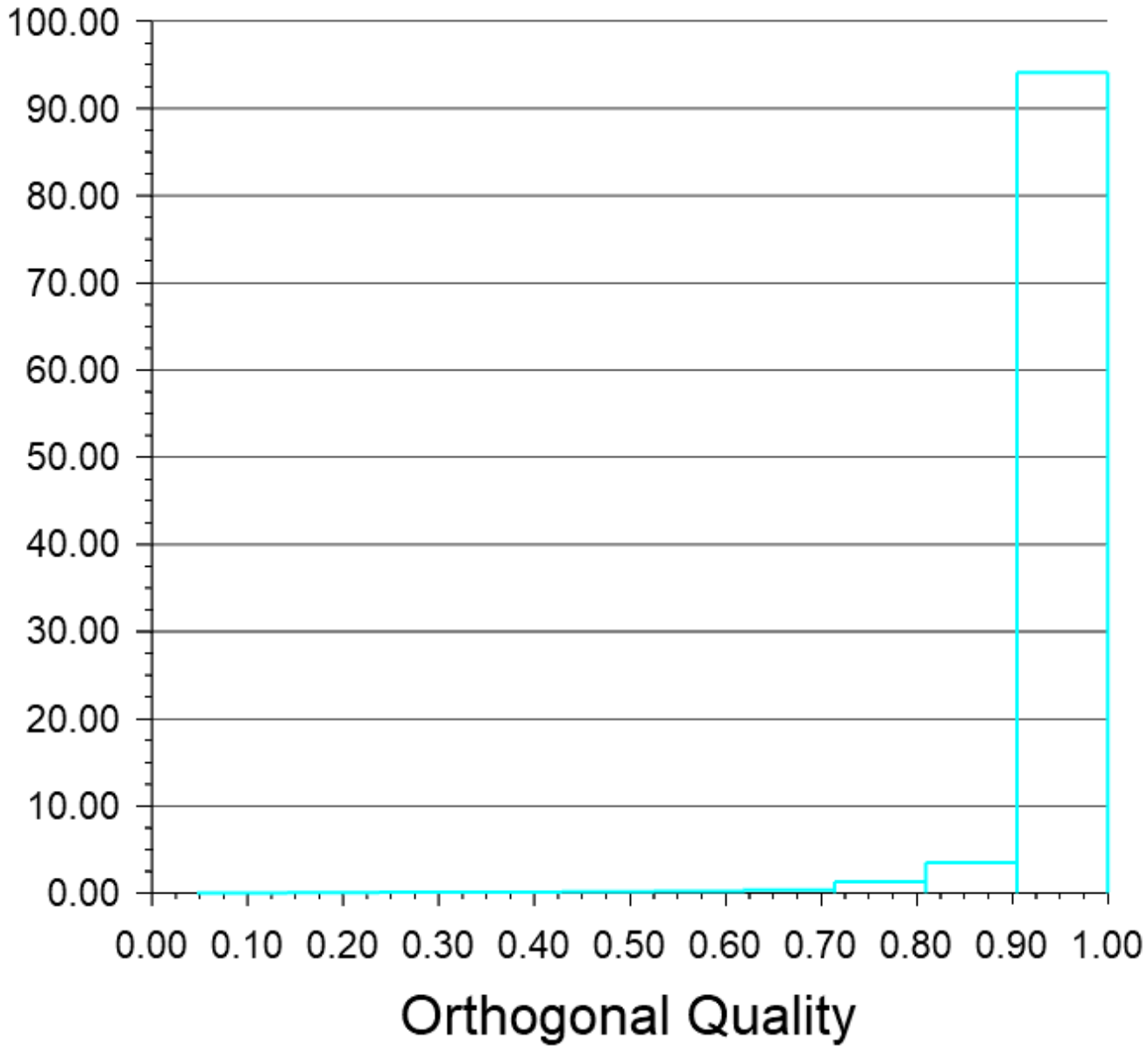
Mesh Size

Cells	Faces	Nodes
268384	536461	268075

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
fluid	Mixed Cell	0.047274143	695.21083

Orthogonal Quality



Simulation Setup

Physics

Models

Model	Settings
Space	2D
Time	Steady
Viscous	SST k-omega turbulence model

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
Thermal Expansion Coefficient	0
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	
— fluid	
Material Name	air
Specify source terms?	no
Specify fixed values?	no
Frame Motion?	no
Laminar zone?	no
Porous zone?	no

Boundary Conditions

— Inlet	
— inlet	
Velocity Specification Method	Magnitude and Direction
Reference Frame	Absolute
Velocity Magnitude [m/s]	65
Supersonic/Initial Gauge Pressure [Pa]	0
Component of Flow Direction (x,y)	(0.997564, 0.0697564)
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	1
Turbulent Viscosity Ratio	1
— Outlet	
— 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 [%]	1
Backflow Turbulent Viscosity Ratio	1
Backflow Pressure Specification	Total Pressure
Build artificial walls to prevent reverse flow?	no
Average Pressure Specification?	no
Specify targeted mass flow rate	no
━ Wall	
━ slat_bottom	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
━ slat_top	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
━ airfoil_top	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
━ airfoil_bottom	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
━ flap_bottom	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
━ flap_top	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Surface Roughness	0

Wall Roughness Height [m]	0
Wall Roughness Constant	0.5

Reference Values

Area	0.7635 m^2
Density	1.225 kg/m^3
Depth	1 m
Enthalpy	0 J/kg
Length	1 m
Pressure	0 Pa
Temperature	288.16 K
Velocity	65 m/s
Viscosity	1.7894e-05 kg/(m s)
Ratio of Specific Heats	1.4
Yplus for Heat Tran. Coef.	300
Reference Zone	fluid

Solver Settings

— Equations	
Flow	True
Turbulence	True
— Numerics	
Absolute Velocity Formulation	True
— Pseudo Transient 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 Transient	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 Temperature [K]	1

Maximum 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	10.475 seconds
Data Read	0.988 seconds
Iteration	719.793 seconds
AMG	421.414 seconds
Virtual Current Memory	0.741997 GB
Virtual Peak Memory	1.52258 GB
Memory Per M Cell	2.67417

Solution Status

Iterations: 322

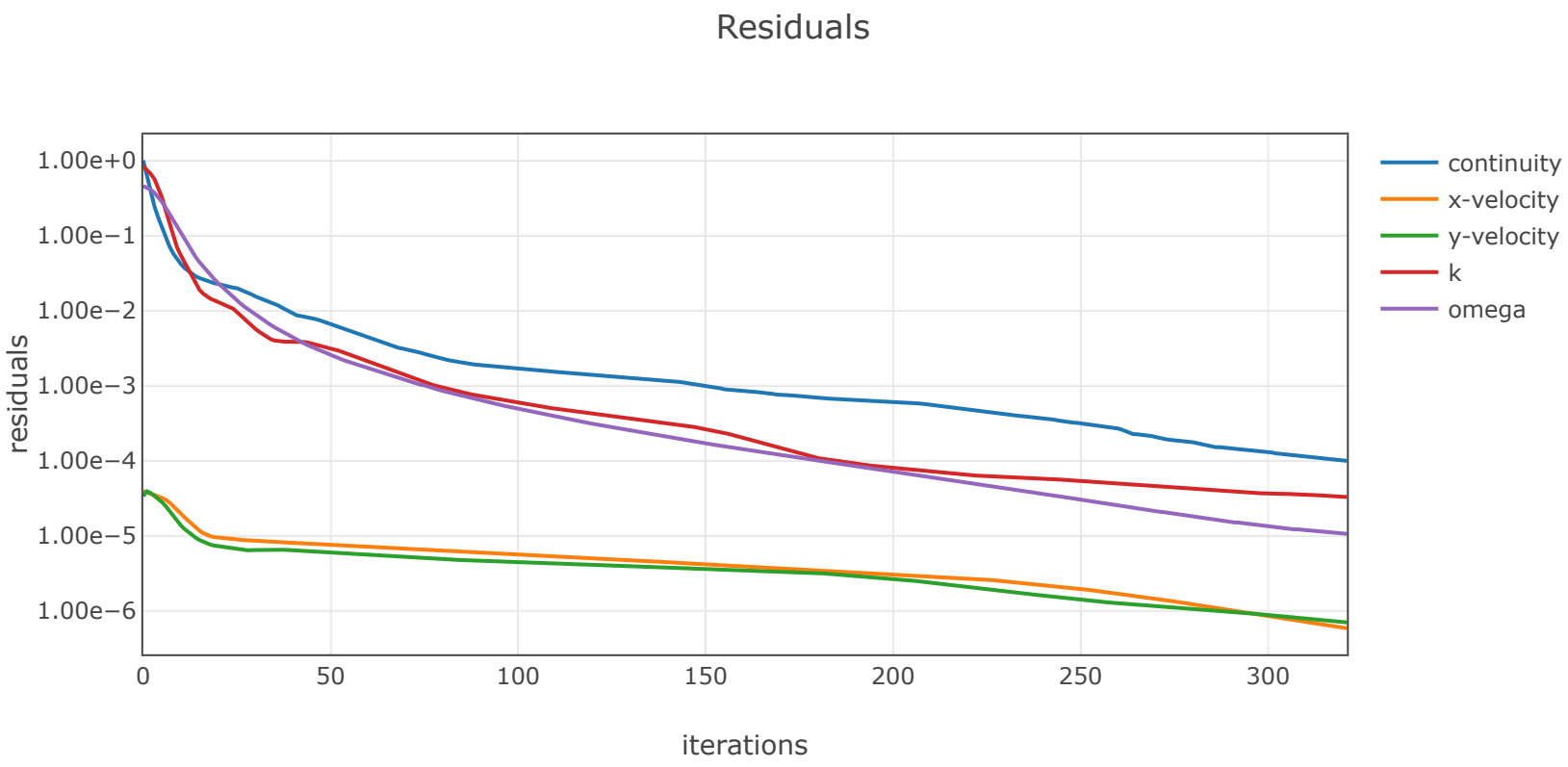
	Value	Absolute Criteria	Convergence Status
continuity	9.927282e-05	0.0001	Converged
x-velocity	5.838634e-07	0.001	Converged
y-velocity	6.985167e-07	0.001	Converged
k	3.27399e-05	0.001	Converged
omega	1.056859e-05	0.001	Converged

Report Definitions

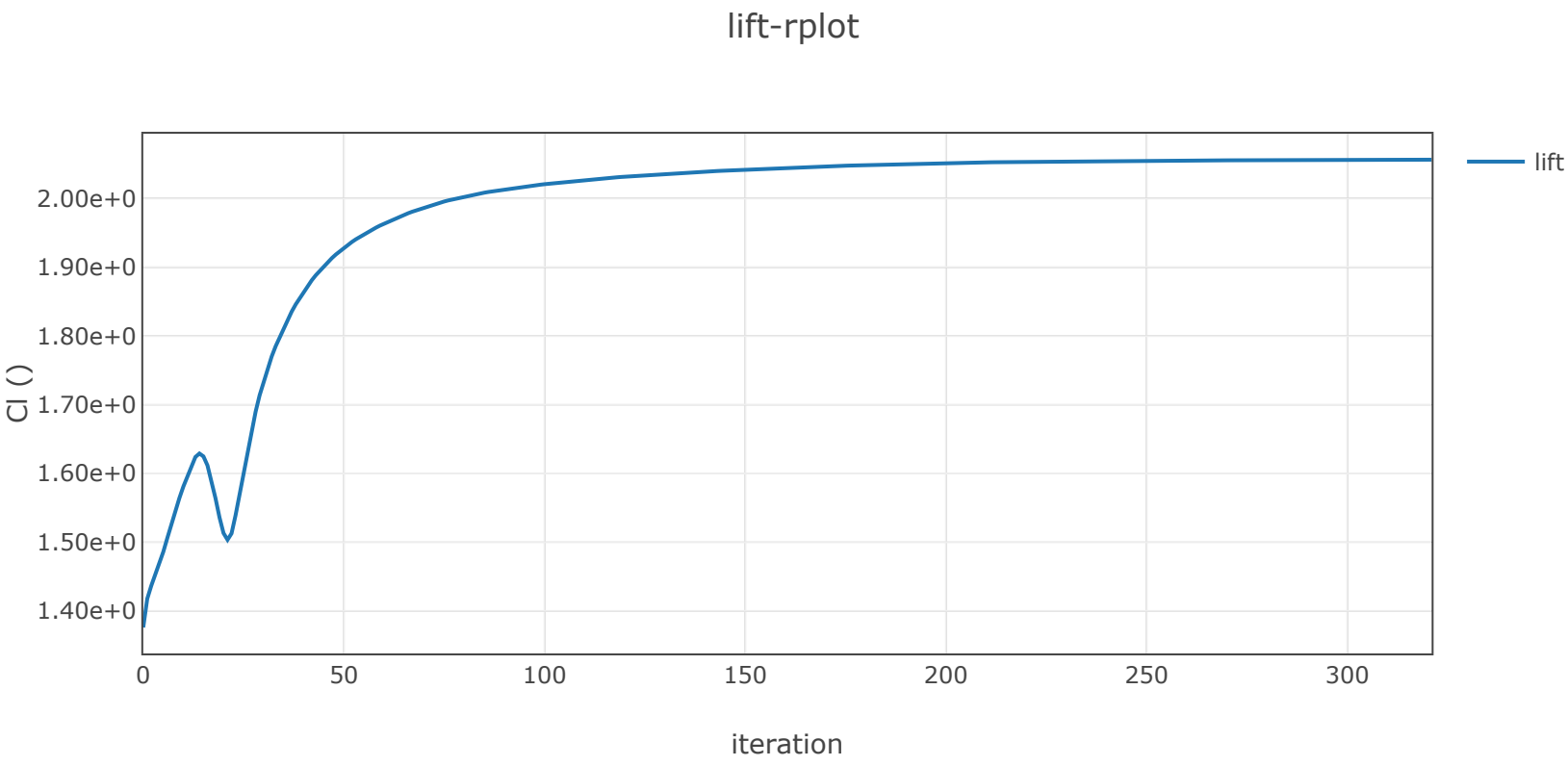
lift	2.056382
drag	0.0411357

Plots

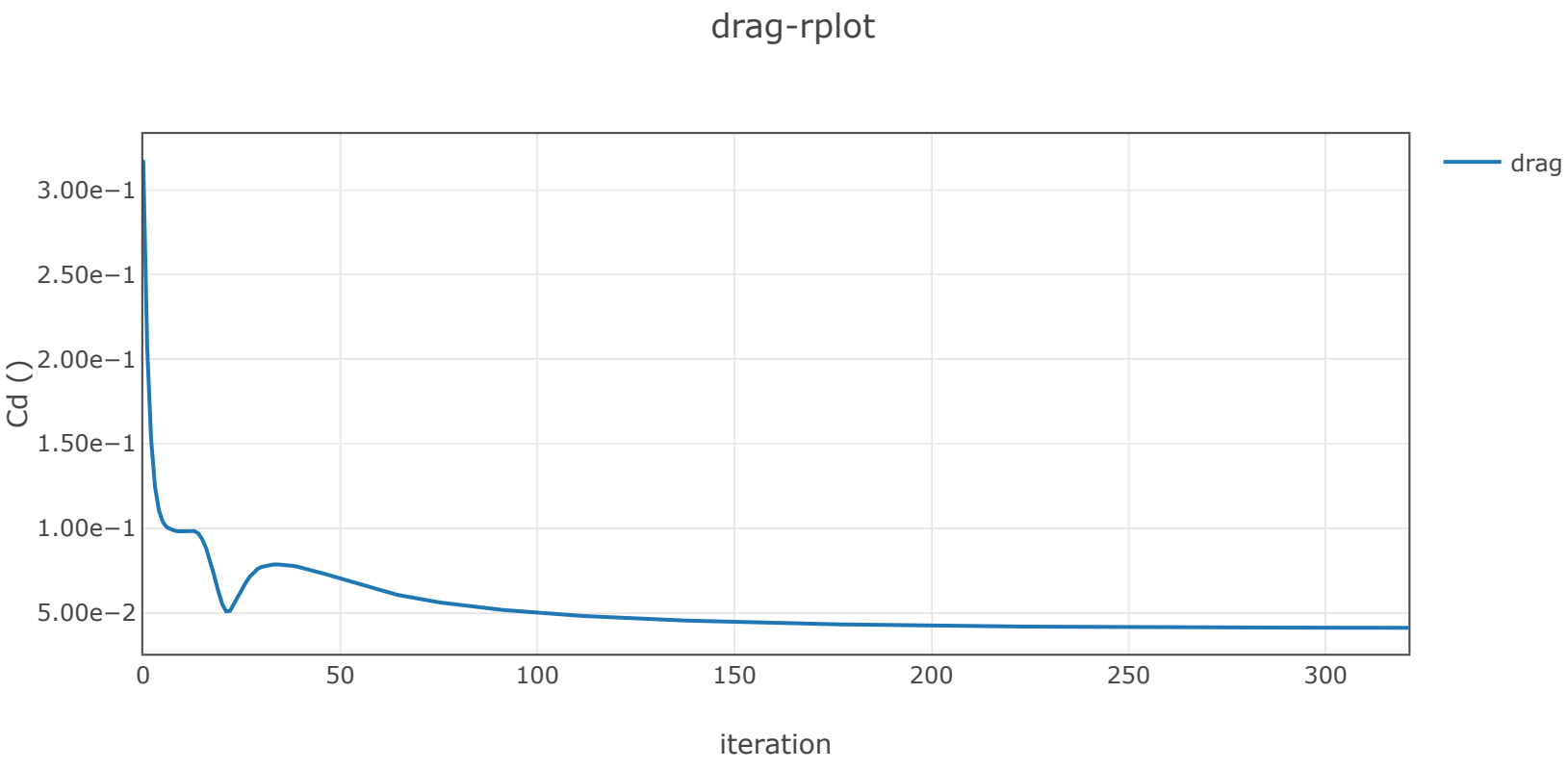
Residuals



lift-rplot

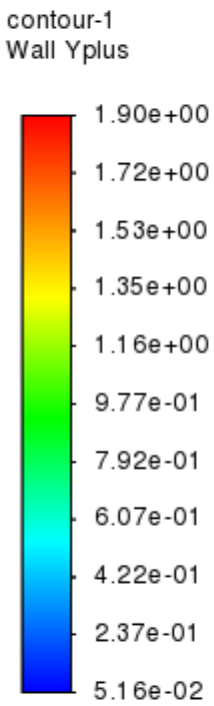


drag-rplot

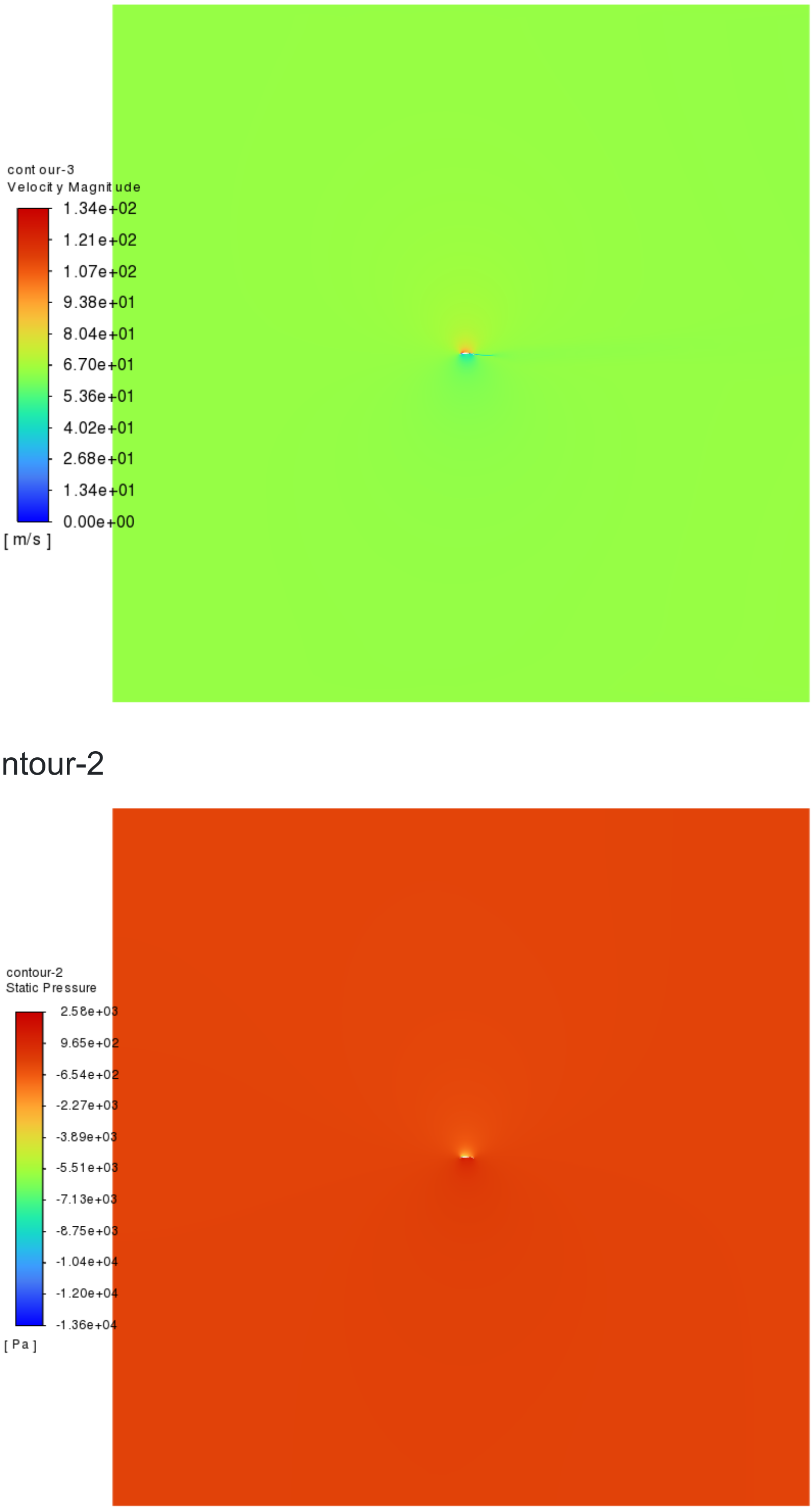


Contours

contour-1



contour-3

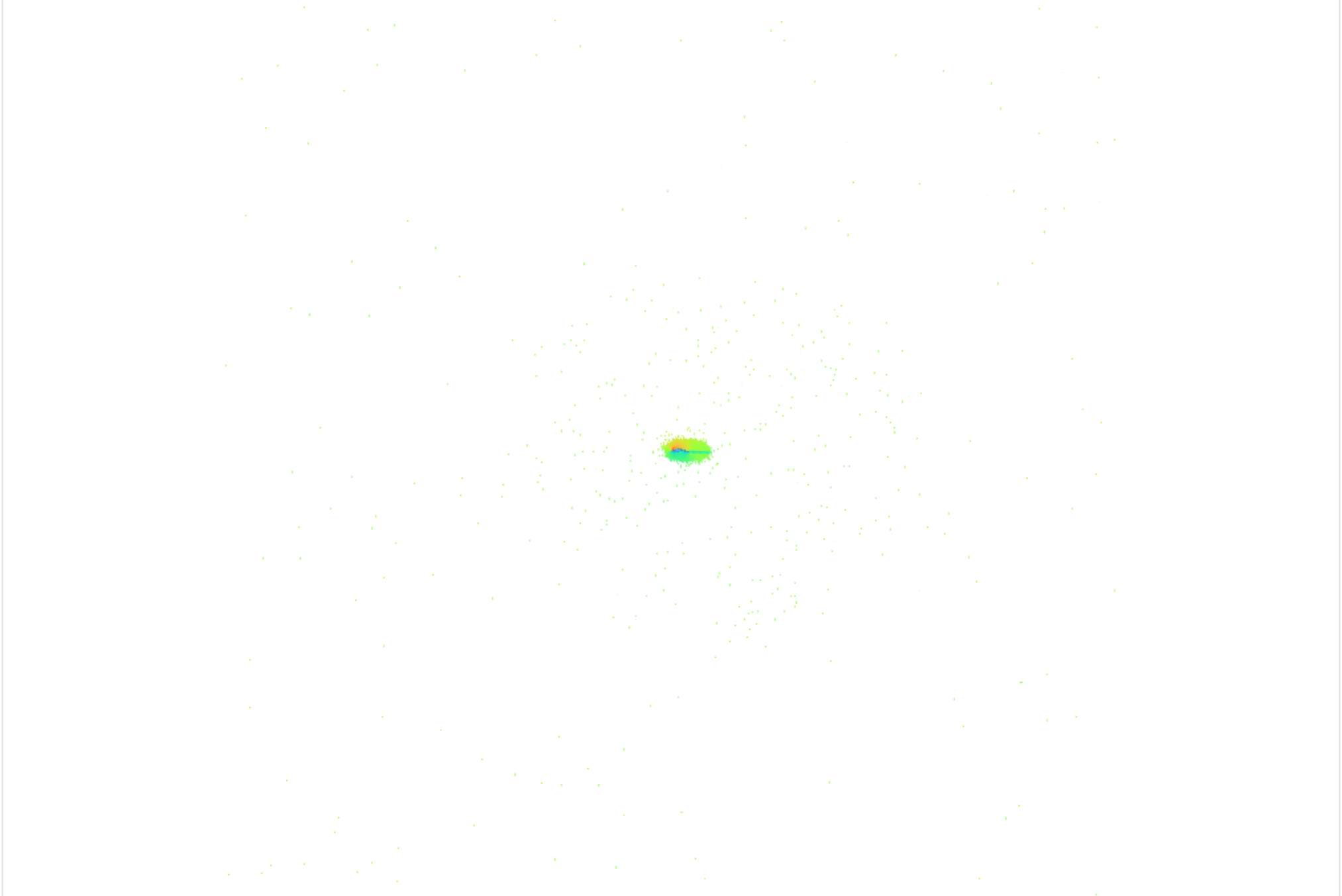

contour-3
Velocity Magnitude
1.34e+02
1.21e+02
1.07e+02
9.38e+01
8.04e+01
6.70e+01
5.36e+01
4.02e+01
2.68e+01
1.34e+01
0.00e+00
[m/s]

contour-2

contour-2
Static Pressure
2.58e+03
9.65e+02
-6.54e+02
-2.27e+03
-3.89e+03
-5.51e+03
-7.13e+03
-8.75e+03
-1.04e+04
-1.20e+04
-1.36e+04
[Pa]

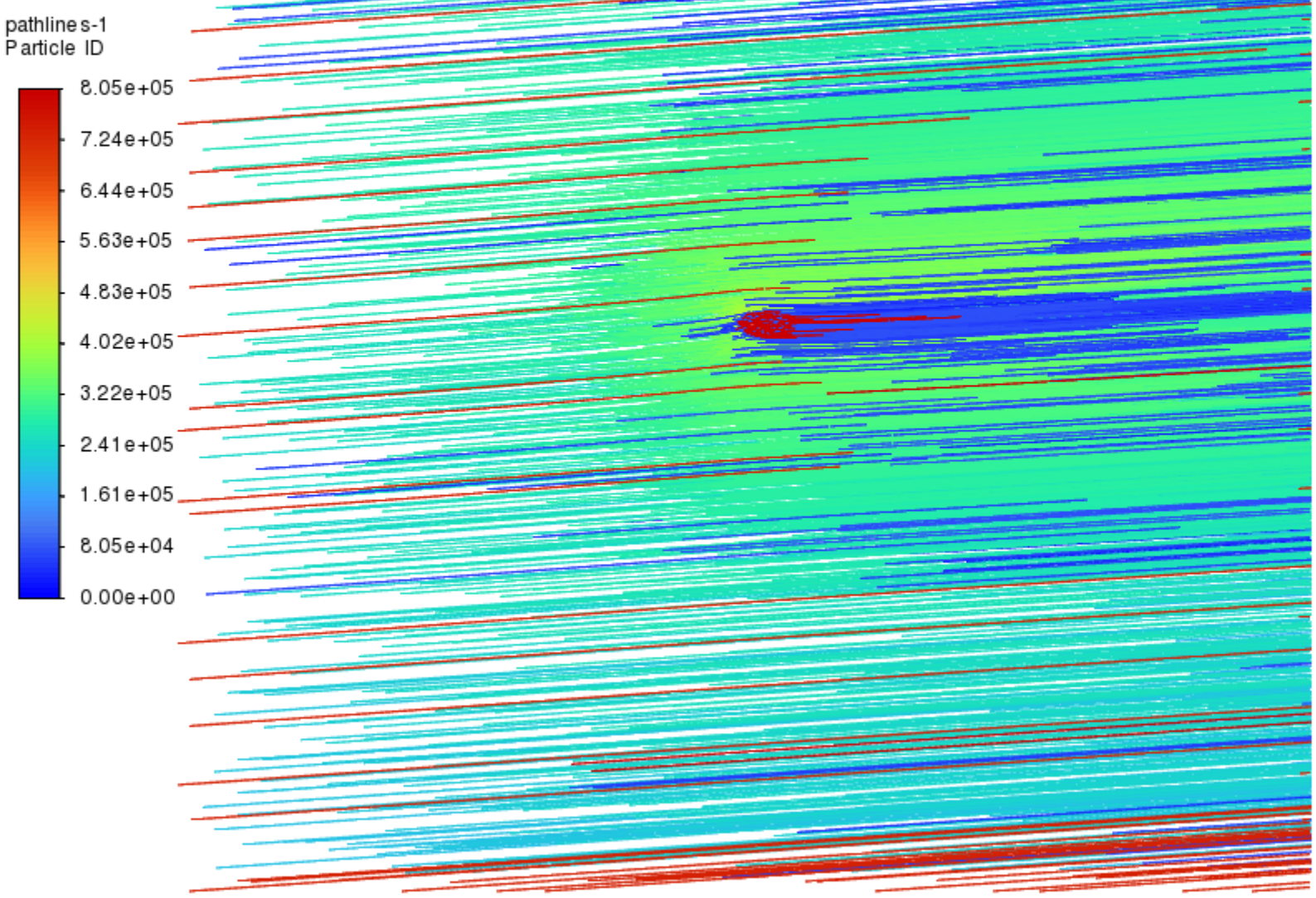
Vectors

vector-1



Pathlines

pathlines-1



XY Plots

xy-plot-1