

# Ansys Fluent Simulation Report

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## System Information

<b>Application</b>	Fluent
<b>Settings</b>	3d, double precision, pressure-based, standard k-epsilon
<b>Version</b>	21.2.0-10201
<b>Source Revision</b>	fc749f05e
<b>Build Time</b>	May 28 2021 13:54:12 EDT
<b>CPU</b>	Intel(R) Core(TM) i7-10710U
<b>OS</b>	Windows

## Geometry and Mesh

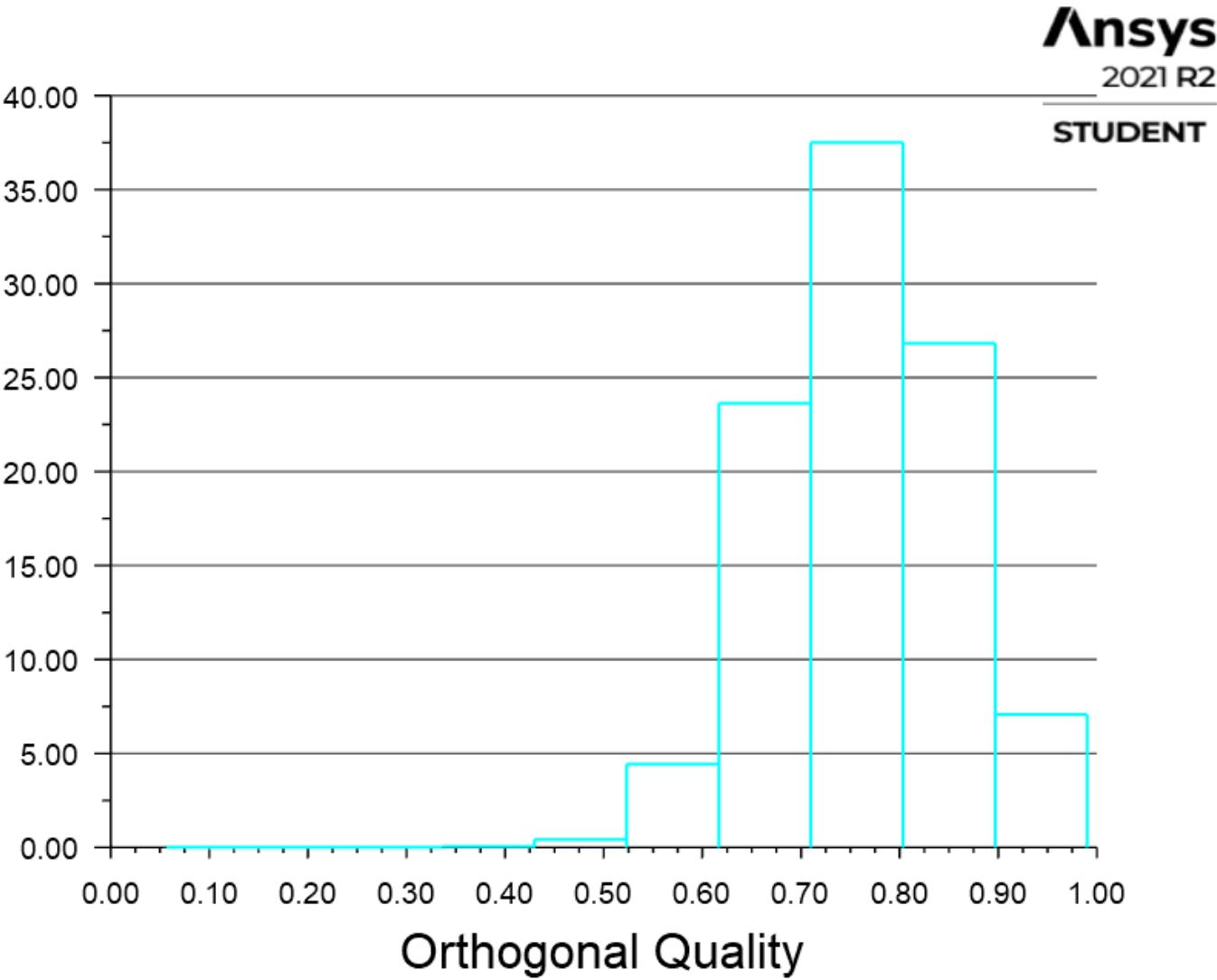
# Mesh Size

Cells	Faces	Nodes
353154	715650	63325

# Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
solid	Mixed Cell	0.056052865	42.162583

# Orthogonal Quality



## Simulation Setup

Physics

Models

Model	Settings
Space	3D
Time	Steady
Viscous	Standard k-epsilon turbulence model

Model	Settings
Wall Treatment	Standard Wall Functions
Heat Transfer	Enabled

## 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	
— 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	
Velocity Specification Method	Magnitude, Normal to Boundary
Reference Frame	Absolute
Velocity Magnitude [m/s]	15
Supersonic/Initial Gauge Pressure [Pa]	0
Temperature [K]	300
Turbulent Specification Method	Intensity and Viscosity Ratio
Turbulent Intensity [%]	5
Turbulent Viscosity Ratio	10
— Outlet	
— outlet	
Backflow Reference Frame	Absolute

Gauge Pressure [Pa]	0
Pressure Profile Multiplier	1
Backflow Total Temperature [K]	300
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	
— wall-20	
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 Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
— wall-19	
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 Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
— wall-17	
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 Roughness Height [m]	0
Wall Roughness Constant	0.5

Convective Augmentation Factor	1
— wall-16	
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 Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
— wall_left	
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
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
— wall_up	
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
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
— wall_right	
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
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip

Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
— wall_down	
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
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1
— aircraft	
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
Enable shell conduction?	no
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
Convective Augmentation Factor	1

## 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
Turbulence	True
Energy	True
— Numerics	
Absolute Velocity Formulation	True
— Pseudo Transient Explicit Relaxation Factors	
Density	1
Body Forces	1
Turbulent Kinetic Energy	0.75
Turbulent Dissipation Rate	0.75
Turbulent Viscosity	1
Energy	0.75
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
Turbulent Dissipation Rate	Second Order Upwind
Energy	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 Turb. Dissipation Rate [m^2/s^3]	1e-20
Maximum Turb. Viscosity Ratio	100000

## Run Information

Number of Machines	1
Number of Cores	2
Case Read	10.327 seconds
Iteration	2416.19 seconds
AMG	1729.08 seconds
Virtual Current Memory	1.18098 GB
Virtual Peak Memory	1.20922 GB
Memory Per M Cell	2.98562

# Solution Status

Iterations: 1000

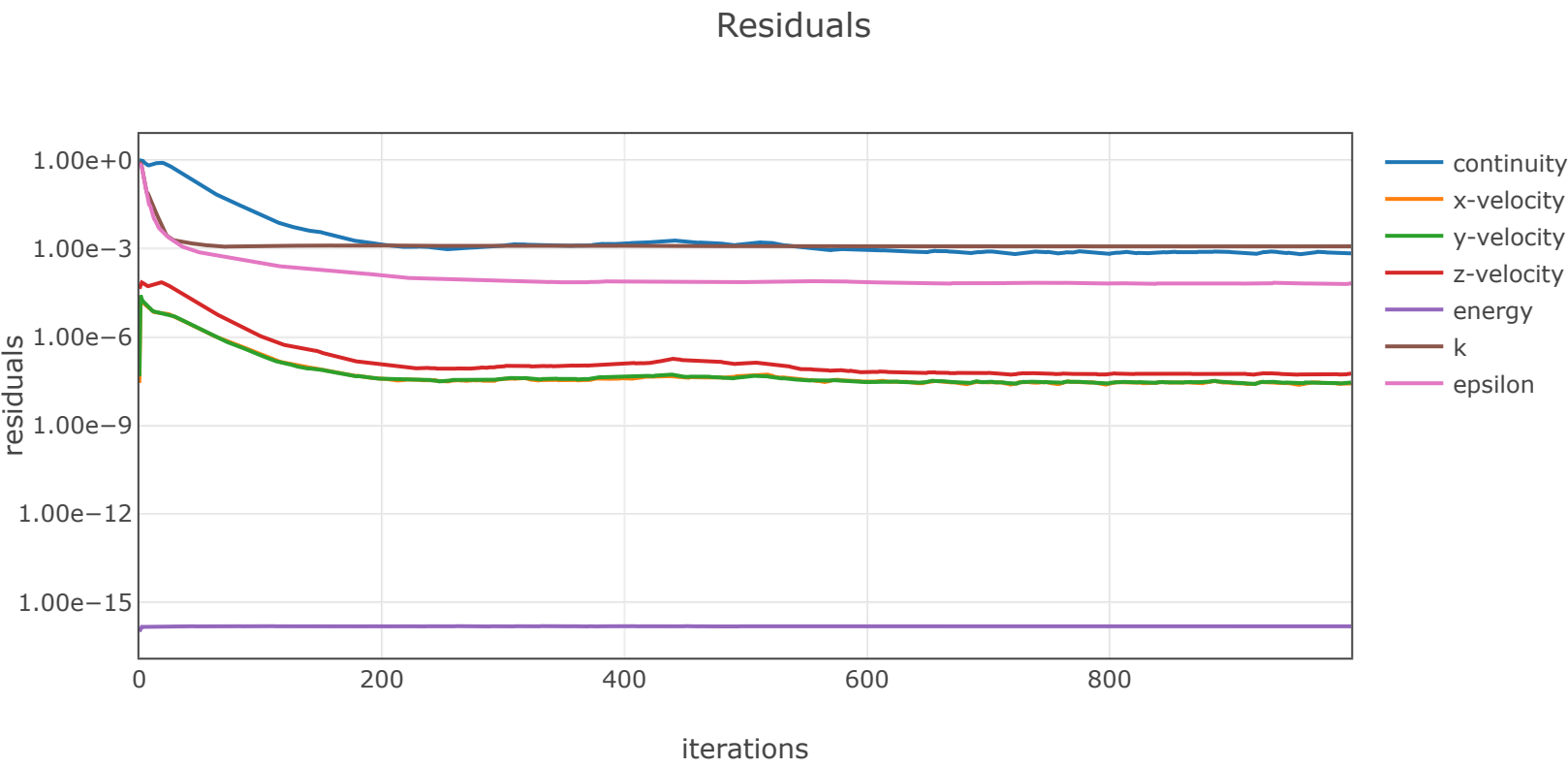
	Value	Absolute Criteria	Convergence Status
continuity	0.0006908148	1e-06	Not Converged
x-velocity	2.851993e-08	1e-06	Converged
y-velocity	2.883581e-08	1e-06	Converged
z-velocity	5.791179e-08	1e-06	Converged
energy	1.556163e-16	1e-06	Converged
k	0.001197349	1e-06	Not Converged
epsilon	6.691404e-05	1e-06	Not Converged

# Report Definitions

drag-co	0.02792047
drag-force	0.01710129 N
lift-co	27.80495
lift-force	17.03053 N

# Plots

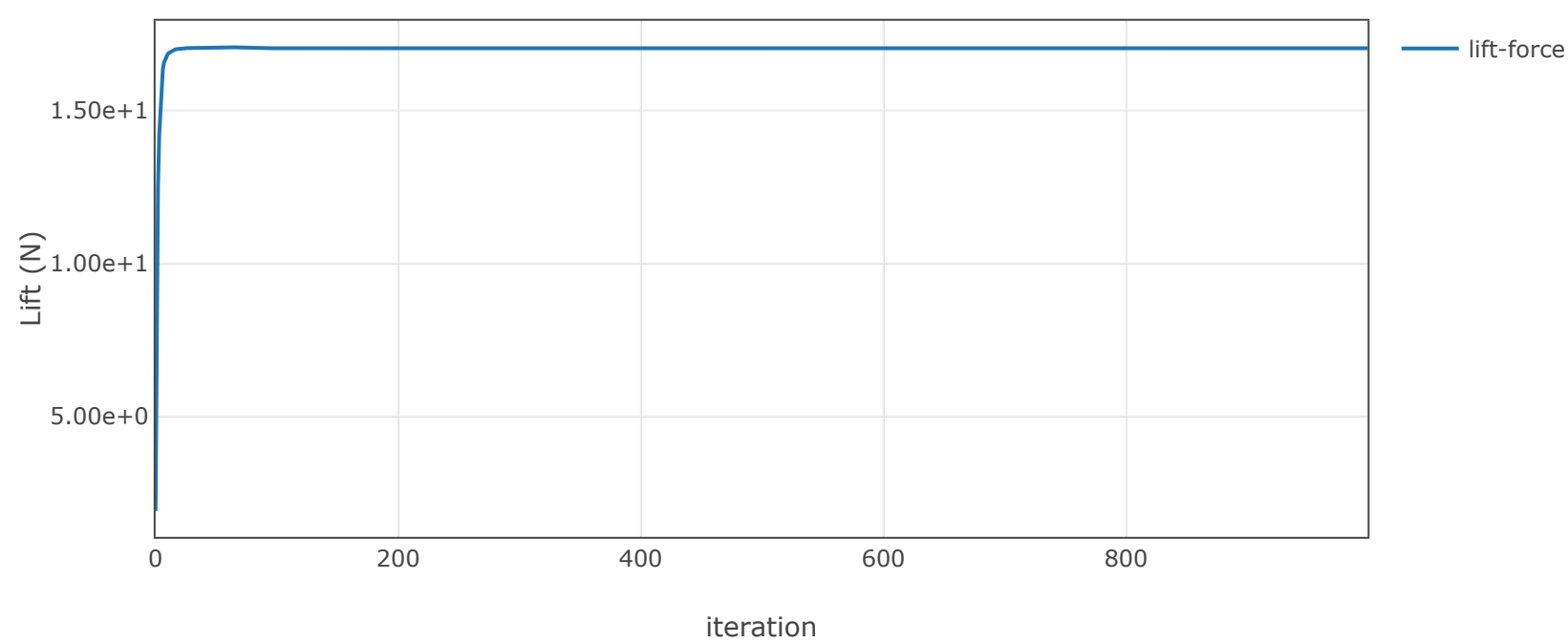
## Residuals



lift-force-rplot

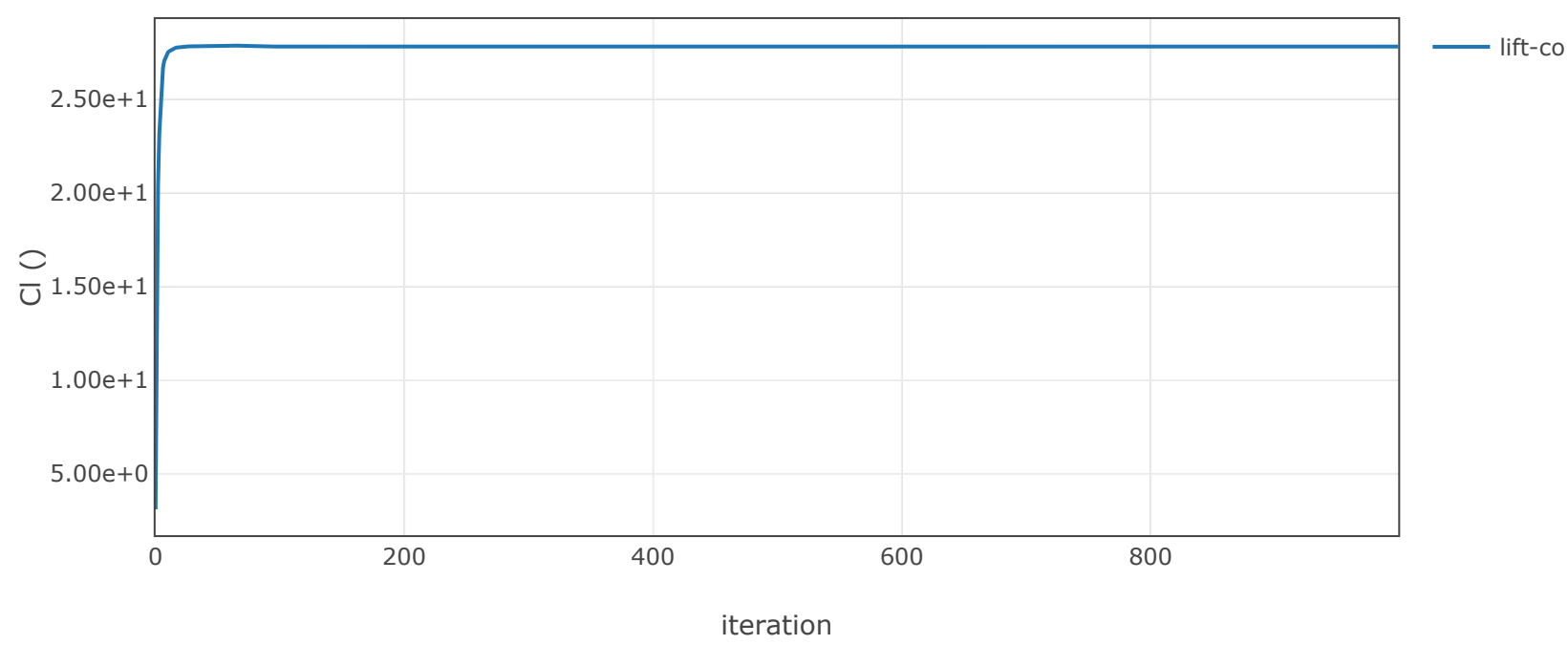


lift-force-rplot



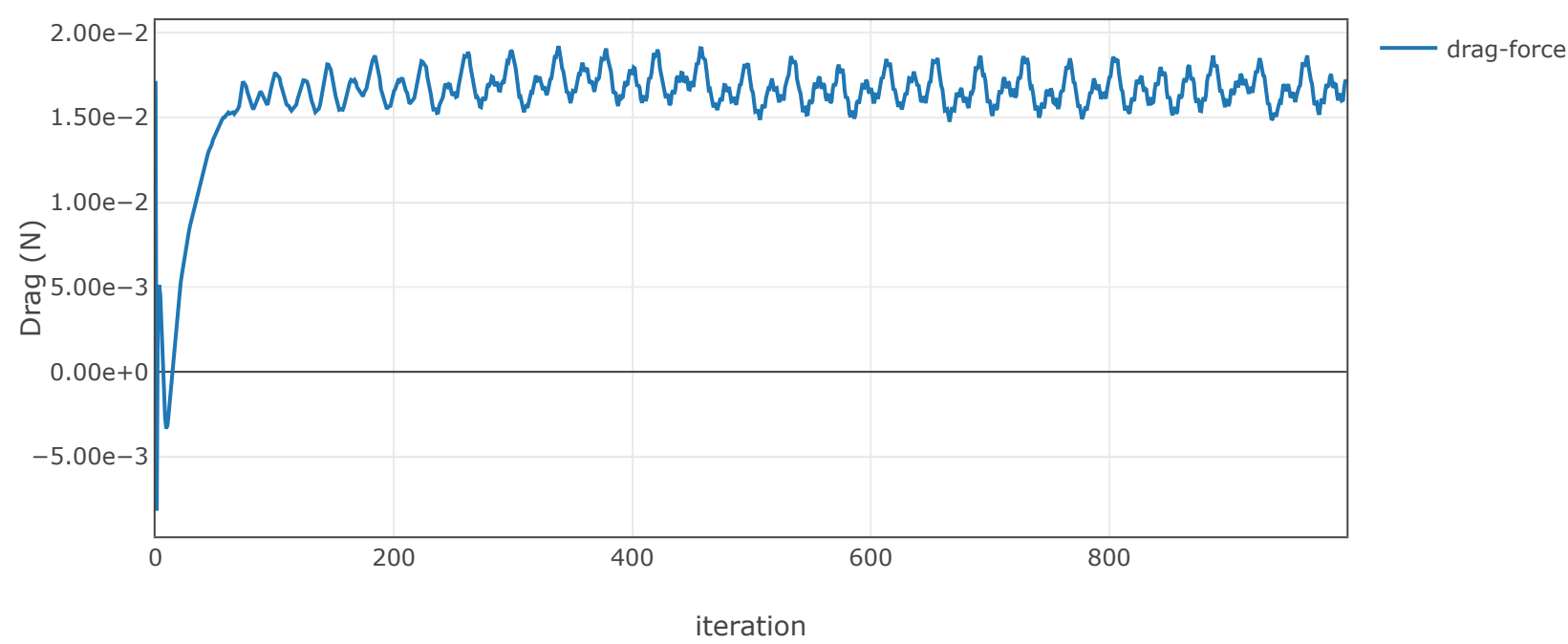
lift-co-rplot

lift-co-rplot

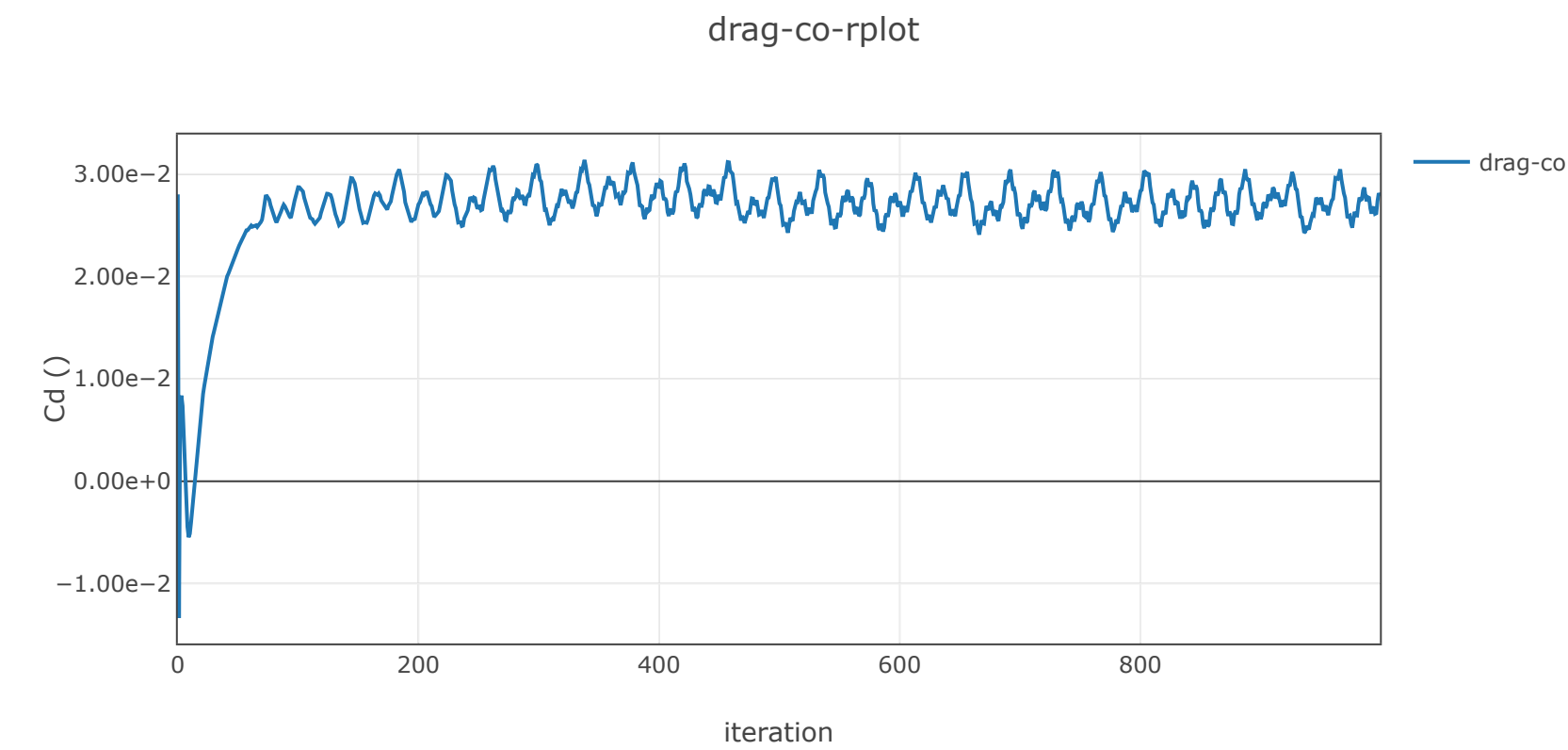


drag-force-rplot

drag-force-rplot



# drag-co-rplot



## Contours

### contour-1

