Ansys
2022 R1

Ansys Fluent Simulation Report

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Date	8/8/2023 10:39 PM

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System Information

Application	Fluent
Settings	3d, double precision, pressure-based, realizable k-epsilon
Version	22.1.0-10213
Source Revision	91b44bc38e
Build Time	Nov 29 2021 12:11:42 EST
CPU	Intel(R) Core(TM) i7-10870H
OS	Windows

Geometry and Mesh

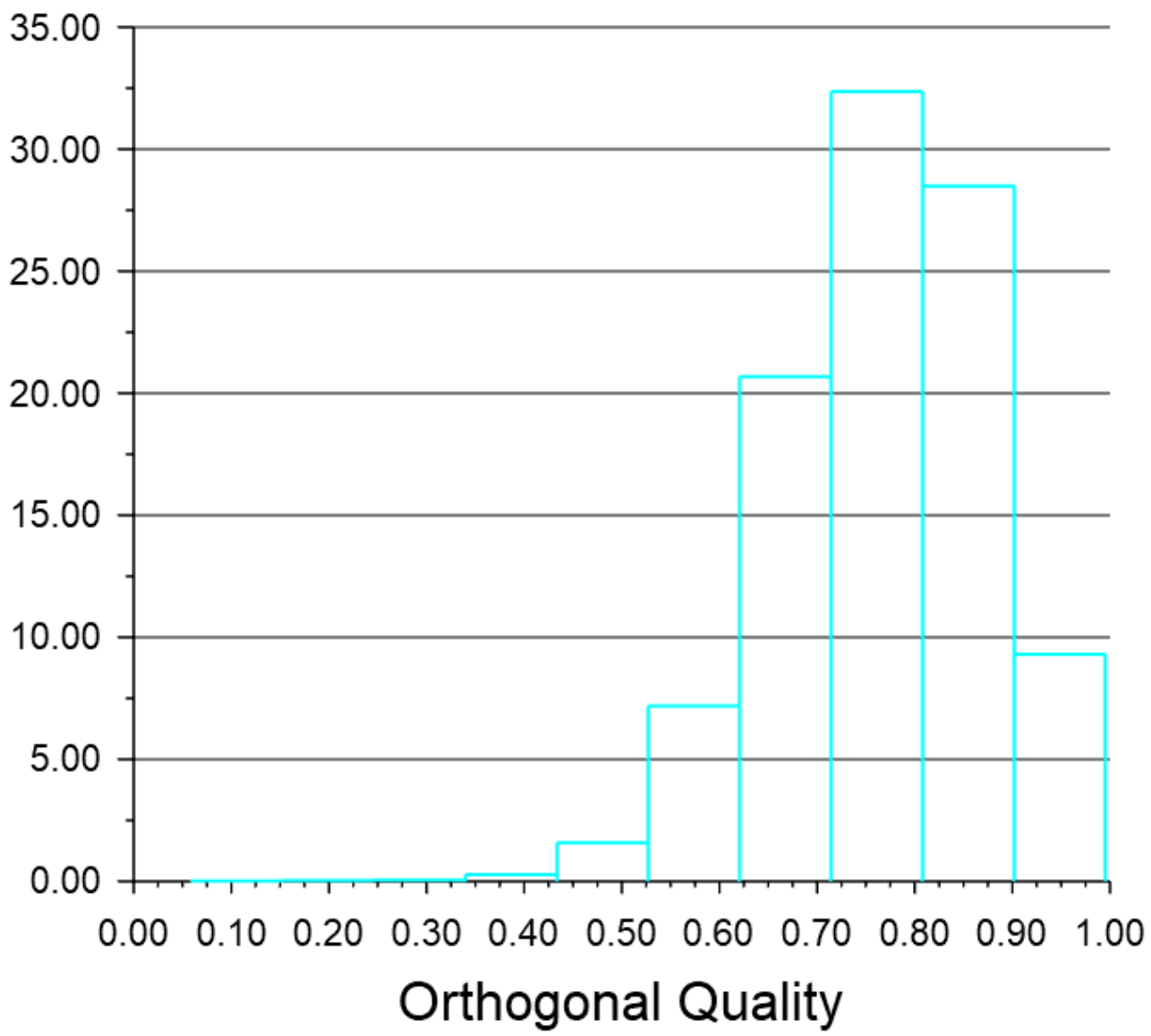
Mesh Size

Cells	Faces	Nodes
3158826	6496317	616959

Mesh Quality

Name	Type	Min Orthogonal Quality	Max Aspect Ratio
fluid_domain	Tet Cell	0.058777646	29.846911

Orthogonal Quality



Simulation Setup

Physics

Models

Model	Settings
Space	3D
Time	Steady

Model	Settings
Viscous	Realizable k-epsilon turbulence model
Wall Treatment	Scalable Wall Function

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	1.81e-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_domain	
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]	6
Supersonic/Initial Gauge Pressure [Pa]	0
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 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-fluid_domain	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
− blade1	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5
− wall	
Wall Motion	Stationary Wall
Shear Boundary Condition	No Slip
Wall Roughness Height [m]	0
Wall Roughness Constant	0.5

Reference Values

Area	0.001836 m^2
Density	1.225 kg/m^3
Enthalpy	0 J/kg
Length	0.102 m
Pressure	0 Pa
Temperature	288.16 K
Velocity	45 m/s
Viscosity	1.81e-05 kg/(m s)
Ratio of Specific Heats	1.4
Yplus for Heat Tran. Coef.	300

Solver Settings

− Equations	
Flow	True

Turbulence	True
— Numerics	
Absolute Velocity Formulation	True
— Under-Relaxation Factors	
Pressure	0.3
Density	1
Body Forces	1
Momentum	0.7
Turbulent Kinetic Energy	0.8
Turbulent Dissipation Rate	0.8
Turbulent Viscosity	1
— Pressure-Velocity Coupling	
Type	SIMPLE
— Discretization Scheme	
Pressure	Second Order
Momentum	Second Order Upwind
Turbulent Kinetic Energy	Second Order Upwind
Turbulent 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 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	15.284 seconds
Iteration	2809.46 seconds
AMG	859.857 seconds
Virtual Current Memory	5.8036 GB
Virtual Peak Memory	6.49995 GB
Memory Per M Cell	1.72406

Solution Status

Iterations: 1000

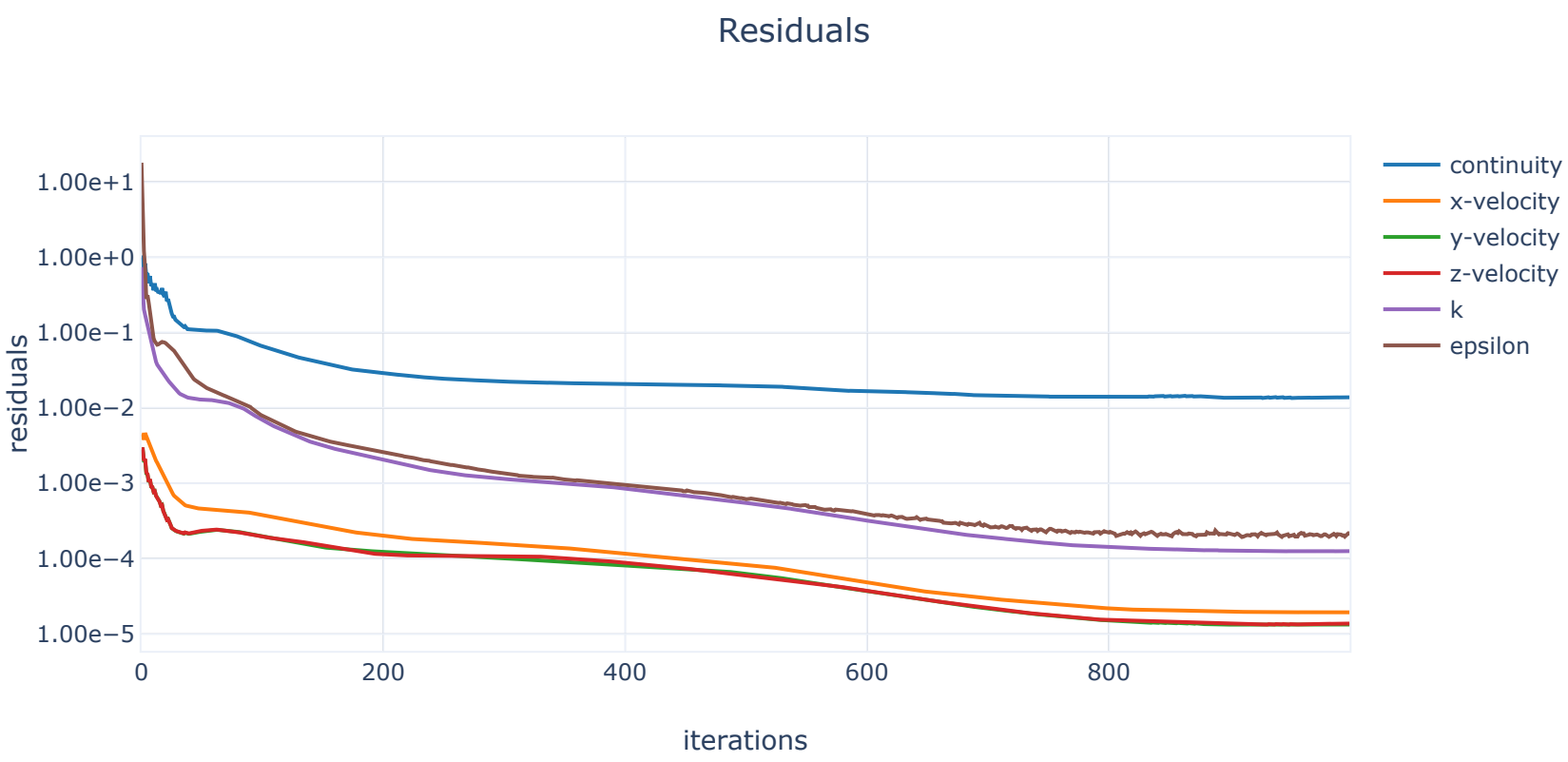
	Value	Absolute Criteria	Convergence Status
continuity	0.01385162	1e-05	Not Converged
x-velocity	1.939048e-05	1e-05	Not Converged
y-velocity	1.335238e-05	1e-05	Not Converged
z-velocity	1.375337e-05	1e-05	Not Converged
k	0.0001258281	1e-05	Not Converged
epsilon	0.0002168879	1e-05	Not Converged

Report Definitions

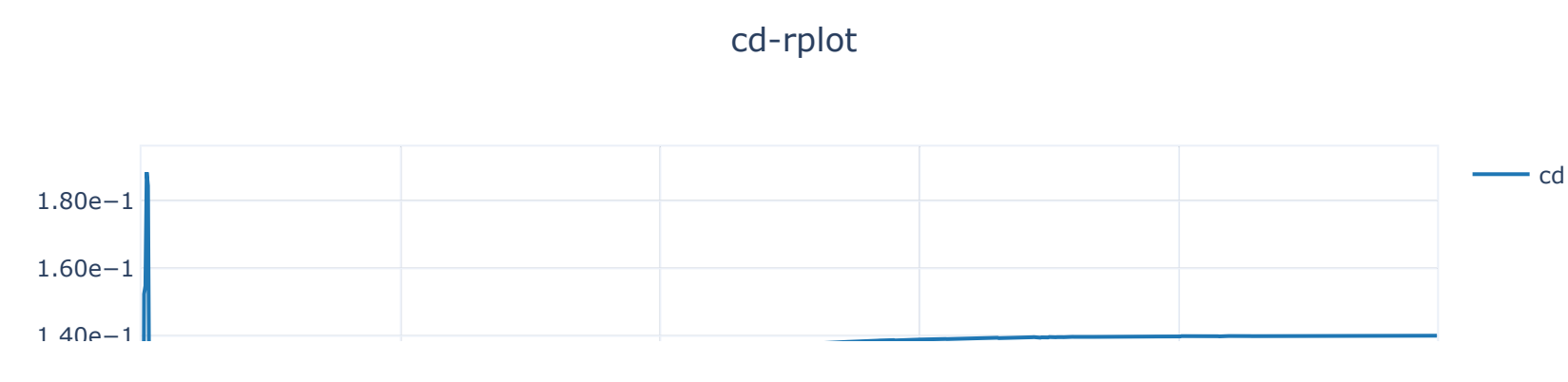
moment	-0.02750247 N m
lift-force	1.364258 N
cl	0.5990907
drag-force	0.3189221 N
cd	0.1400493

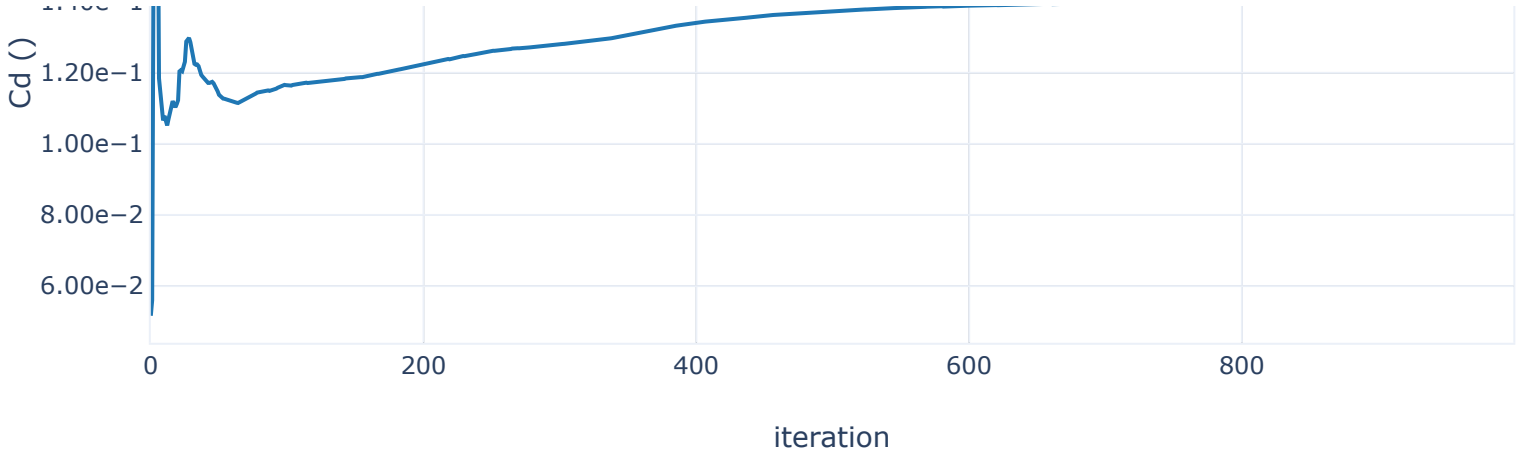
Plots

Residuals

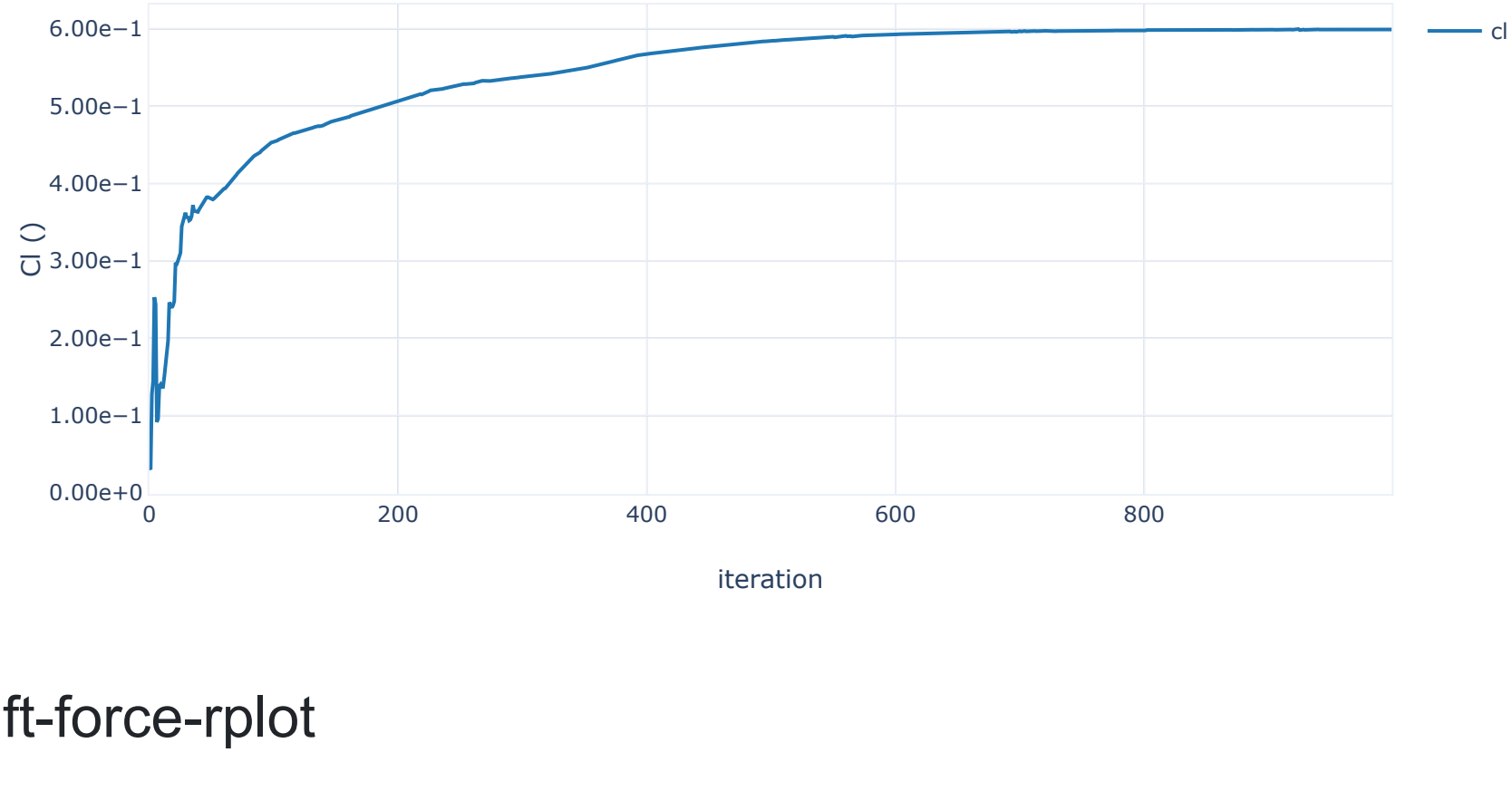


cd-rplot



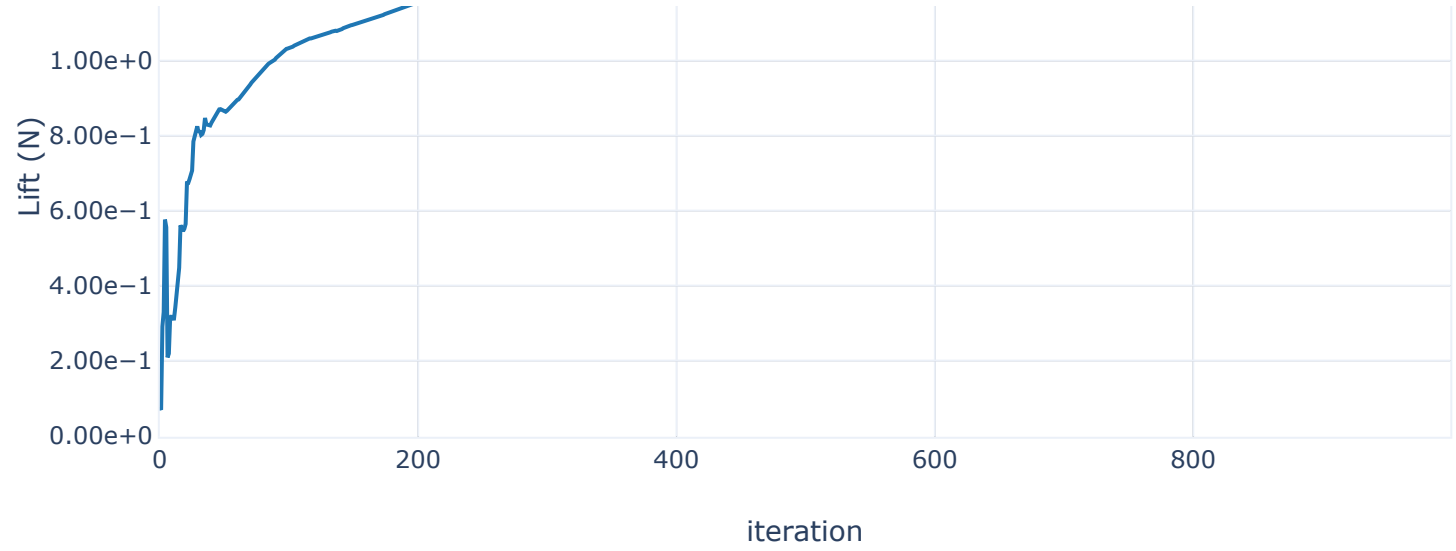


drag-force-rplot



cl-rplot

lift-force-rplot



moment-rplot