

# Ansys Fluent Simulation Report

|                |                    |
|----------------|--------------------|
| <b>Analyst</b> | prati              |
| <b>Date</b>    | 6/17/2023 01:38 PM |

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## System Information

|                        |                                                   |
|------------------------|---------------------------------------------------|
| <b>Application</b>     | Fluent                                            |
| <b>Settings</b>        | 2d, double precision, pressure-based, SST k-omega |
| <b>Version</b>         | 21.2.0-10201                                      |
| <b>Source Revision</b> | fc749f05e                                         |
| <b>Build Time</b>      | May 28 2021 13:54:44 EDT                          |
| <b>CPU</b>             | AMD Ryzen 5 5500U with Radeon Graphics            |
| <b>OS</b>              | Windows                                           |

## Geometry and Mesh

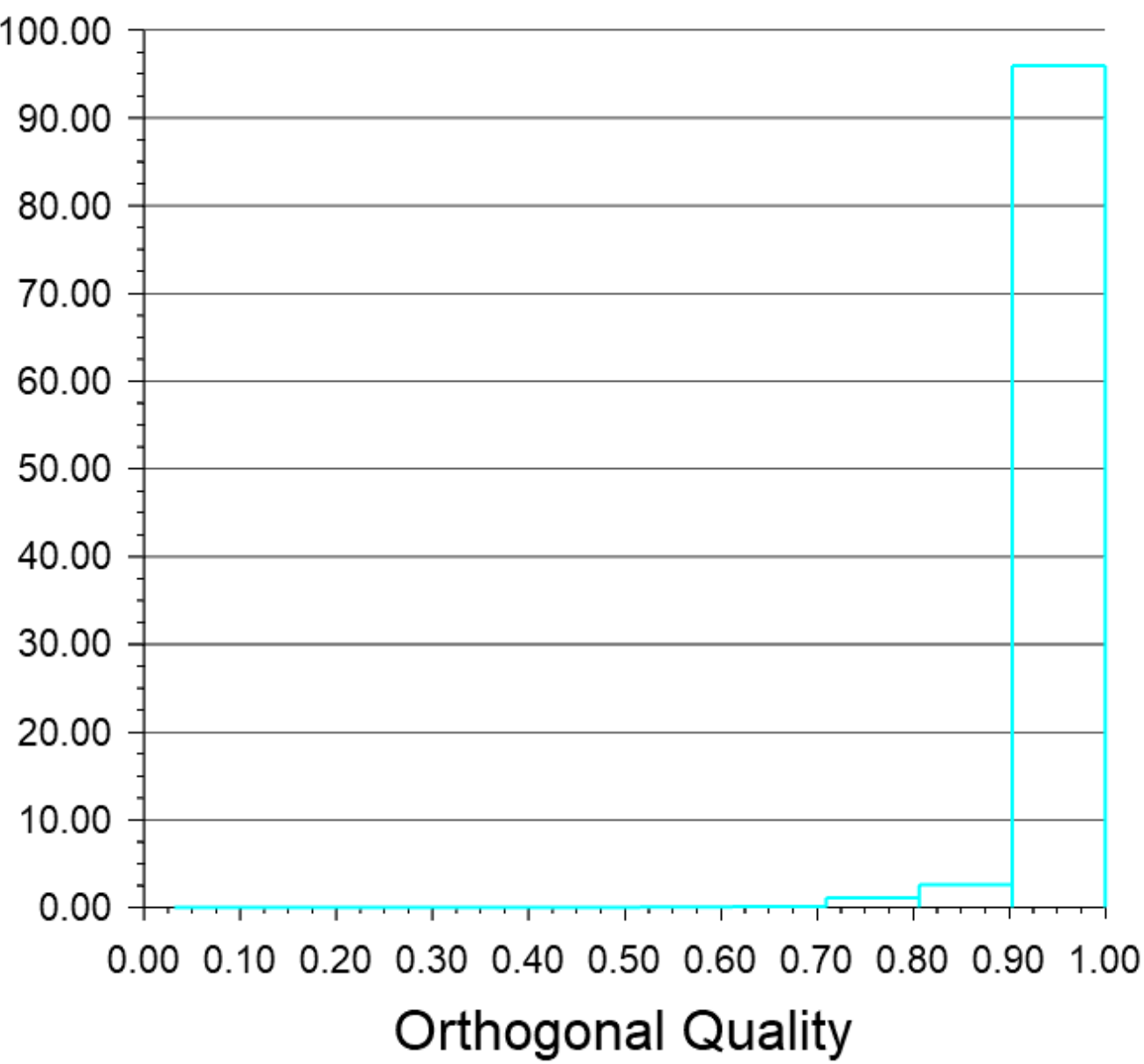
## Mesh Size

| Cells  | Faces  | Nodes  |
|--------|--------|--------|
| 226286 | 452819 | 226533 |

## Mesh Quality

| Name  | Type       | Min Orthogonal Quality | Max Aspect Ratio |
|-------|------------|------------------------|------------------|
| fluid | Mixed Cell | 0.031734845            | 505.28252        |

## Orthogonal Quality



## Simulation Setup

| Physics |          |
|---------|----------|
| Models  |          |
| Model   | Settings |

| 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                                          |                               |
| — 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                           |

## 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              | 4.569 seconds |
| Data Read              | 0.435 seconds |
| Virtual Current Memory | 0.727467 GB   |
| Virtual Peak Memory    | 0.757092 GB   |
| Memory Per M Cell      | 2.57362       |

## Solution Status

Iterations: 305

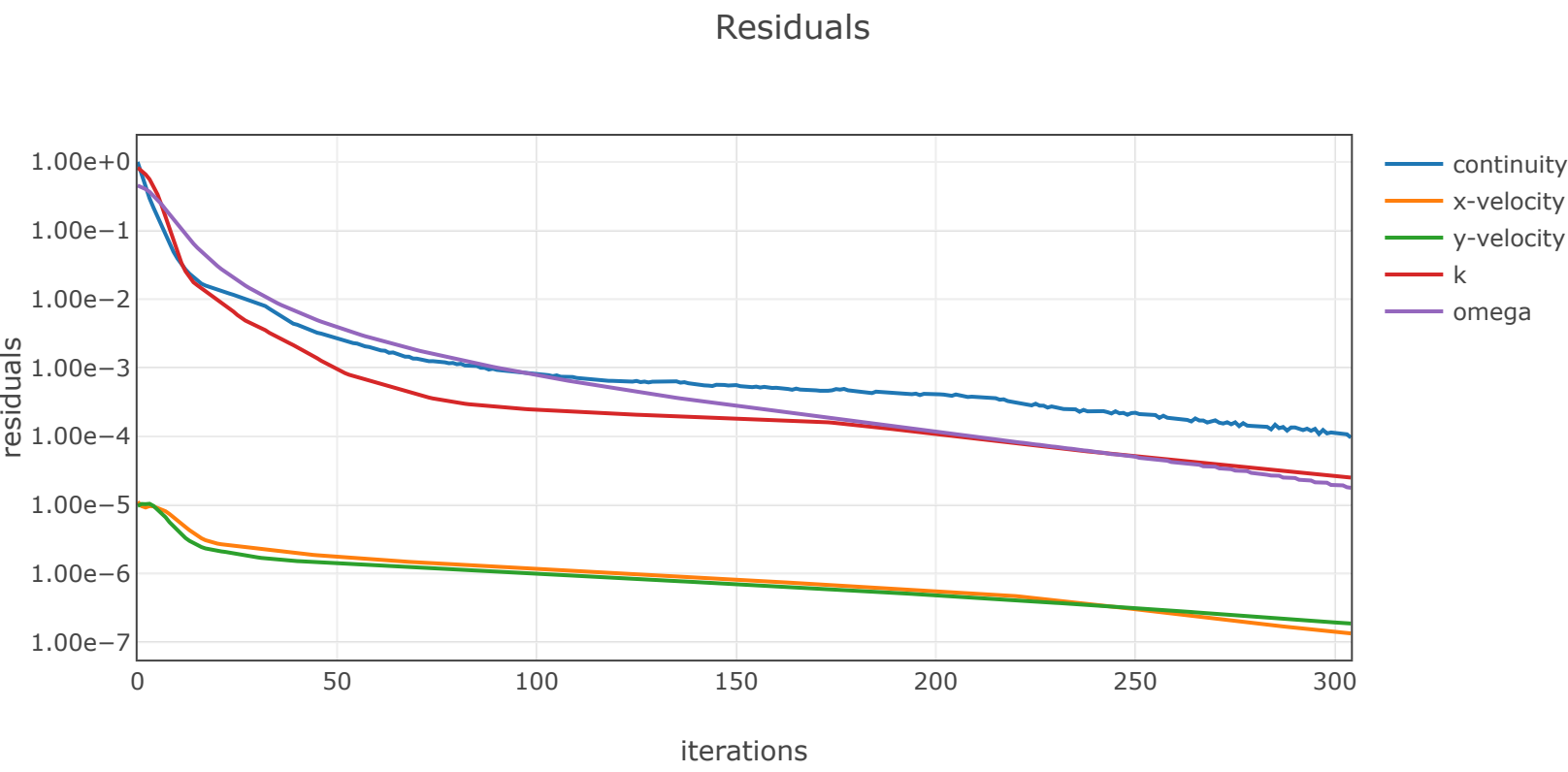
|            | Value        | Absolute Criteria | Convergence Status |
|------------|--------------|-------------------|--------------------|
| continuity | 9.600839e-05 | 0.0001            | Converged          |
| x-velocity | 1.343921e-07 | 0.001             | Converged          |
| y-velocity | 1.873217e-07 | 0.001             | Converged          |
| k          | 2.508434e-05 | 0.001             | Converged          |
| omega      | 1.7827e-05   | 0.001             | Converged          |

## Report Definitions

|      |            |
|------|------------|
| lift | 0.4009617  |
| drag | 0.01275302 |

## Plots

### Residuals



## Contours

### contour-1

