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CFD and Performance Simulations of Wind Turbines

16 December 2023

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CFD and Performance Simulations of Wind Turbines

Visualization Test Case Using Paraview

Ezgi ASLAN

PhD Cand., Department of Aerospace Enginering, METU

Aerodynamics Eng., Turkish Aerospace

16 December 2023

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Visualization Test Case Using Paraview

What is Paraview?

ParaView is an open-source multiple-platform application for visualizing 2D/3D data. It is a post processing program which is used by many academic, government, and commercial institutions.

Paraview can easily be downloaded from website: https://www.paraview.org/download/

Paraview tutorials are available at: https://docs.paraview.org/en/latest/UsersGuide/index.html

Visualization Test Case Using Paraview

Paraview can read broad range of data formats:

- ParaViewData (.pvd)
- Visualization ToolKit (vtk)
- VTK Unstructured grid (vtu)
- CGNS , Fluent Case (.cas), OpenFoam (.foam), NASTRAN (.nas), Tecplot (.tec), IGES (.iges), STEP (.stp), CSV etc.

Visualization Test Case Using Paraview

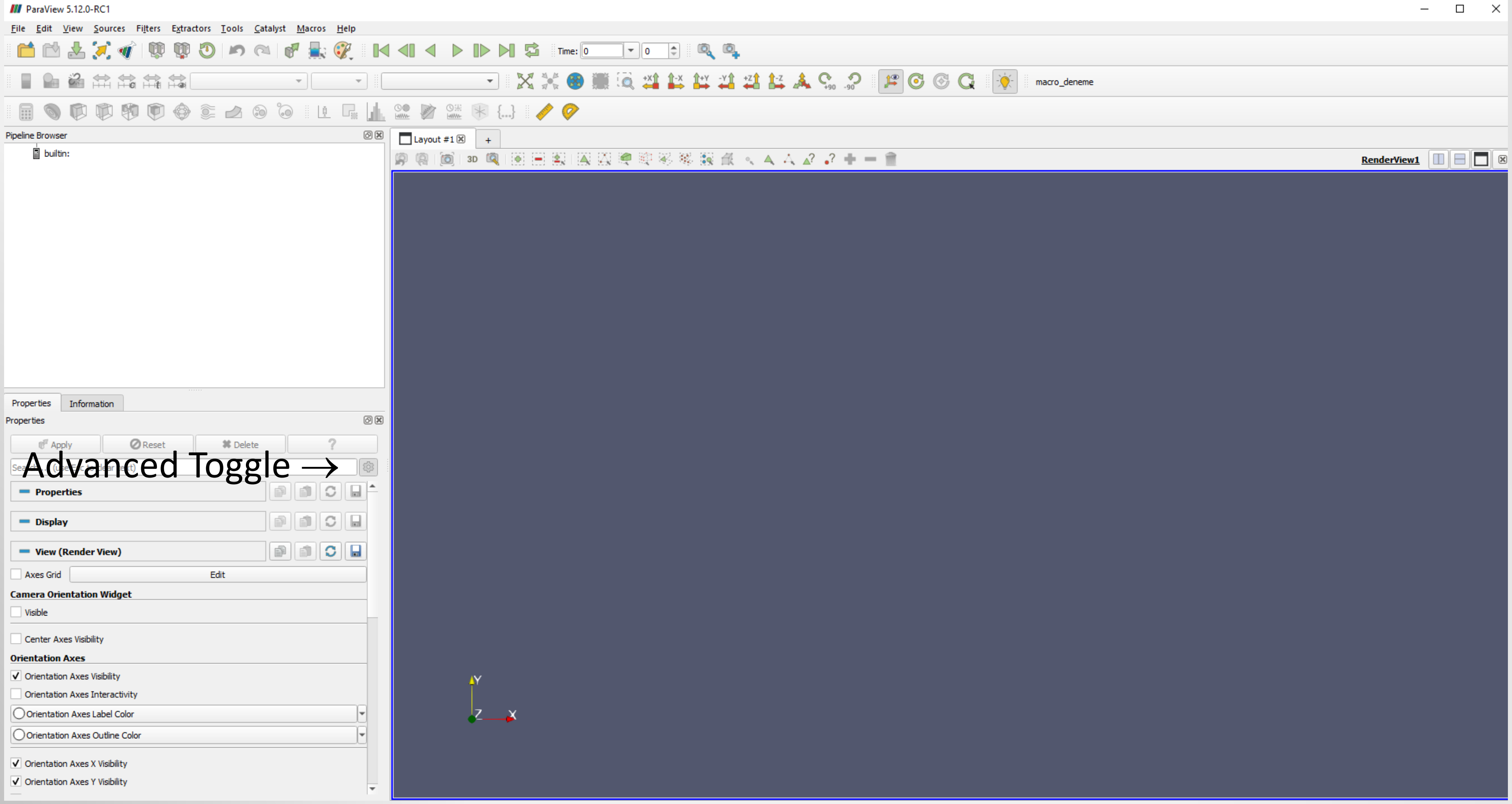
GUI

Menu Bar →

Tool Bar →

Pipeline Browser →

Properties Panel →



Advanced Toggle →

← 3D View

Visualization Test Case Using Paraview

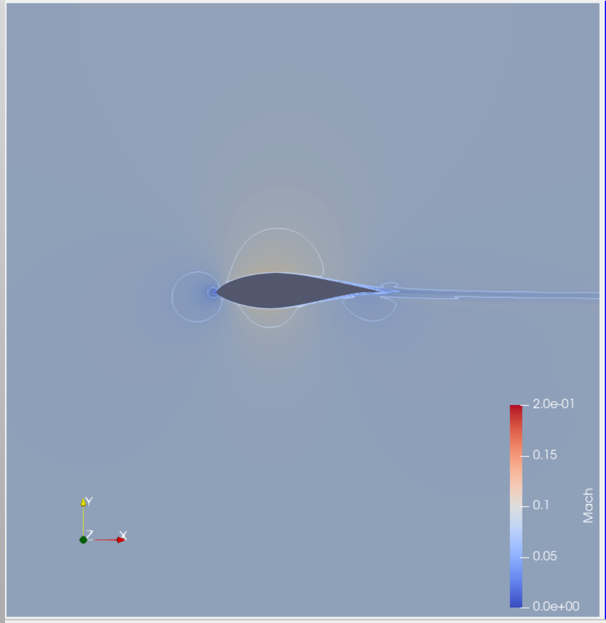
Personalize your GUI from **View** options on Menu. You can also create 3D objects from **Sources** option. Performing basic filtering on data can be achieved from **Filters (Alphabetical)** option.

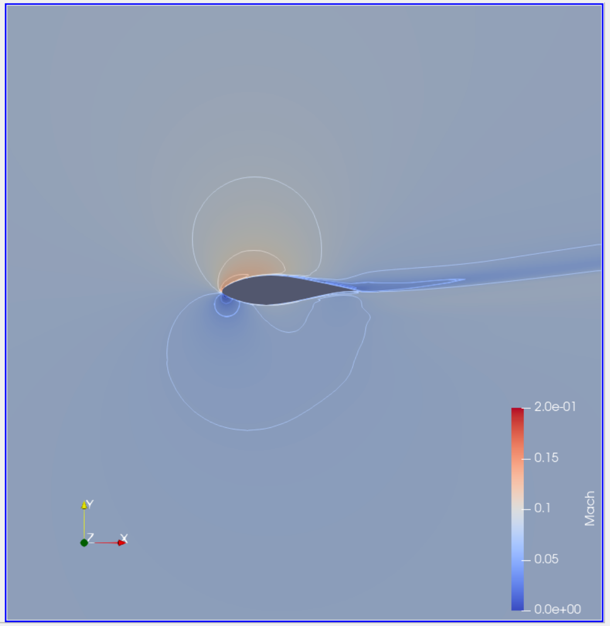
Left mouse click: Rotation
Right mouse click: Panning
Middle button: Zooming
Ctrl+Space: Filters

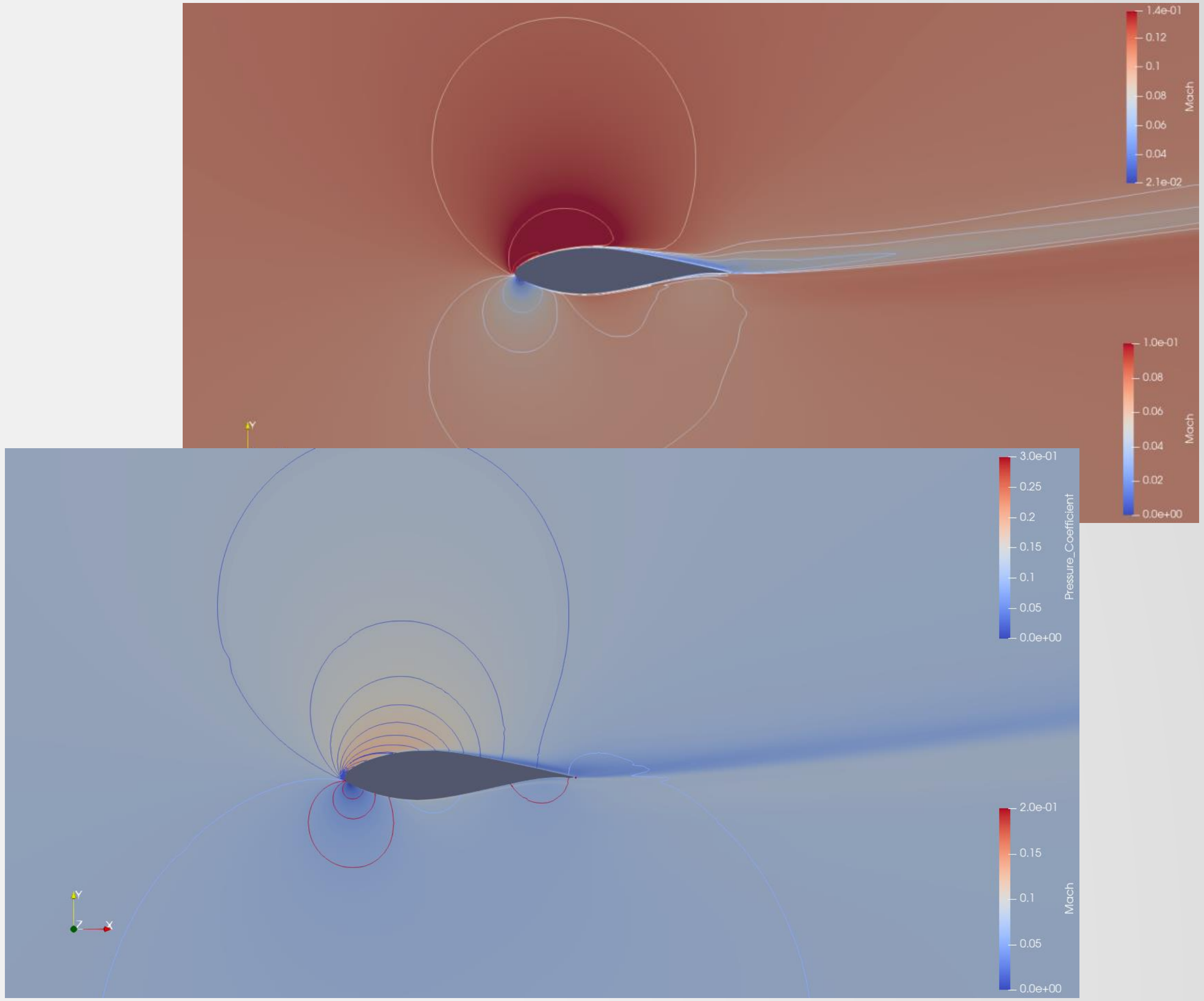
Visualization Test Case Using Paraview

Contour Plots:
Mach Surface & Mach Contour
Mach Surface & Pressure Coef. Contour
Color Bar: Edit

For comparison **Copy&Paste** Properties:

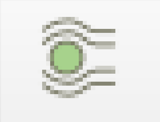




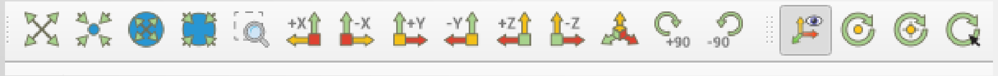


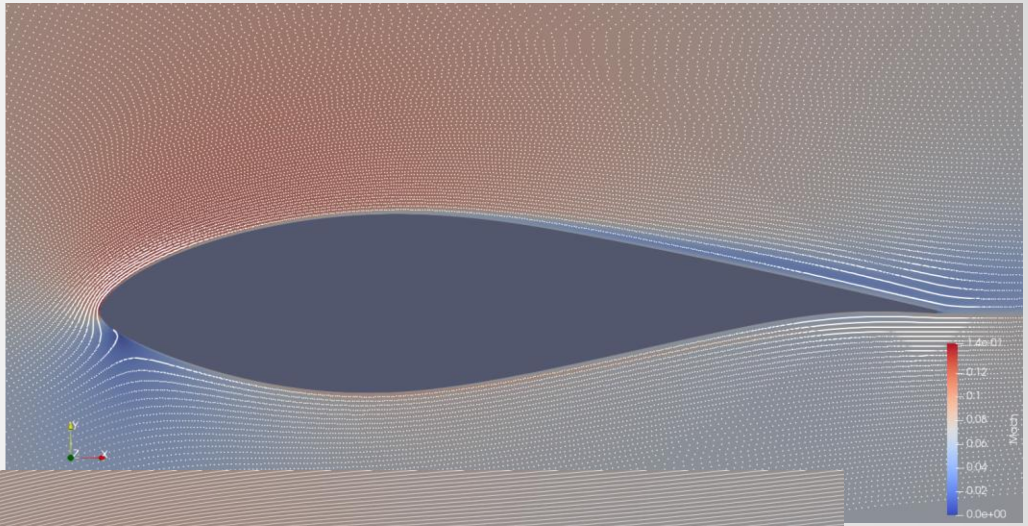
Visualization Test Case Using Paraview

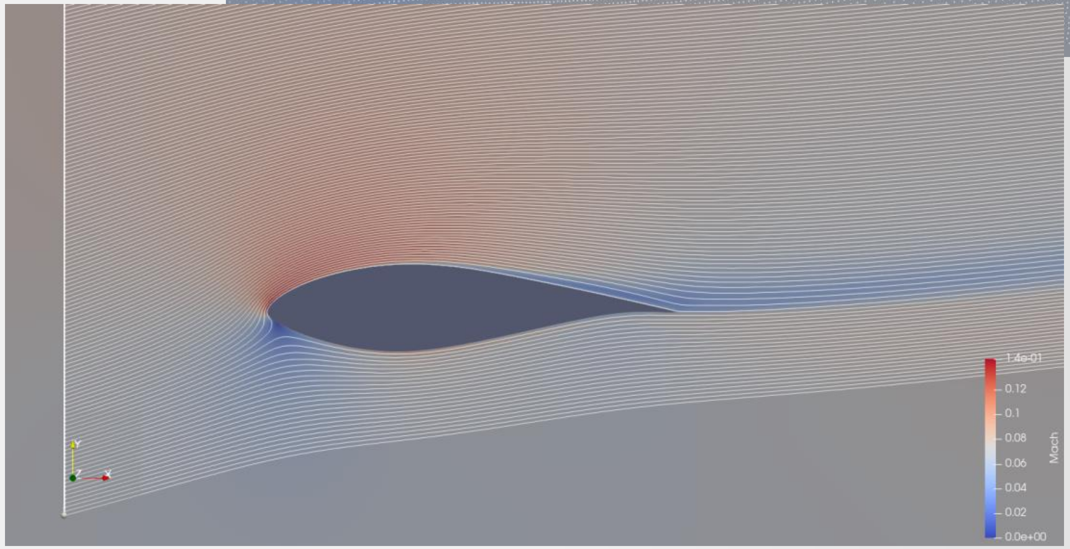
Stream Tracer:



Camera View:



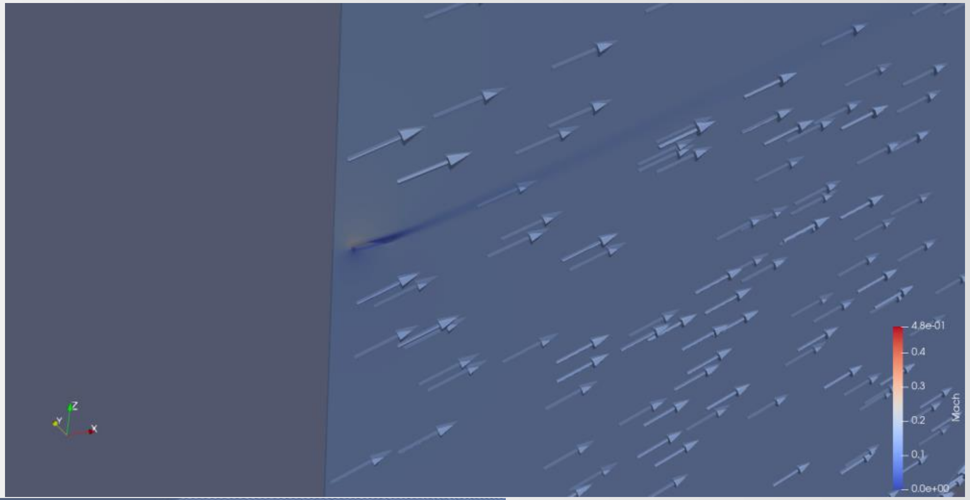


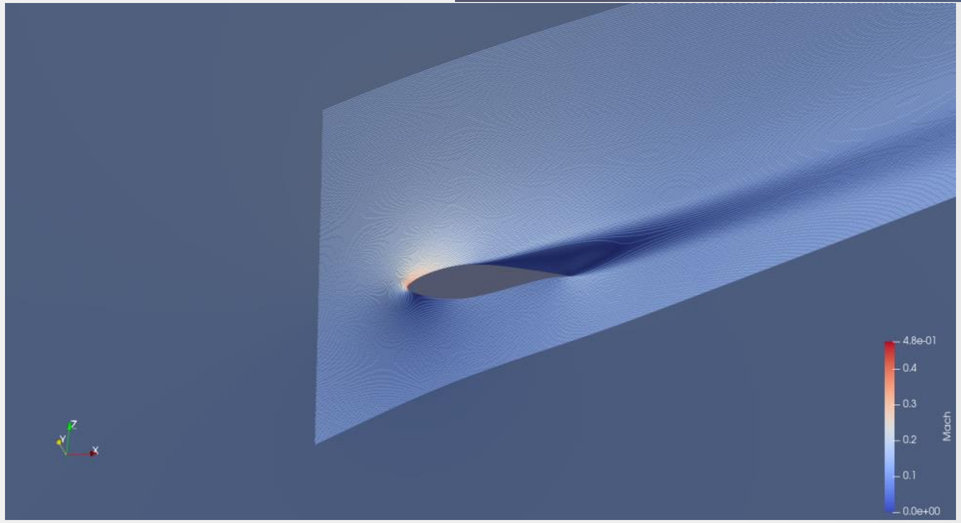


Visualization Test Case Using Paraview

3D Clip and Slice:

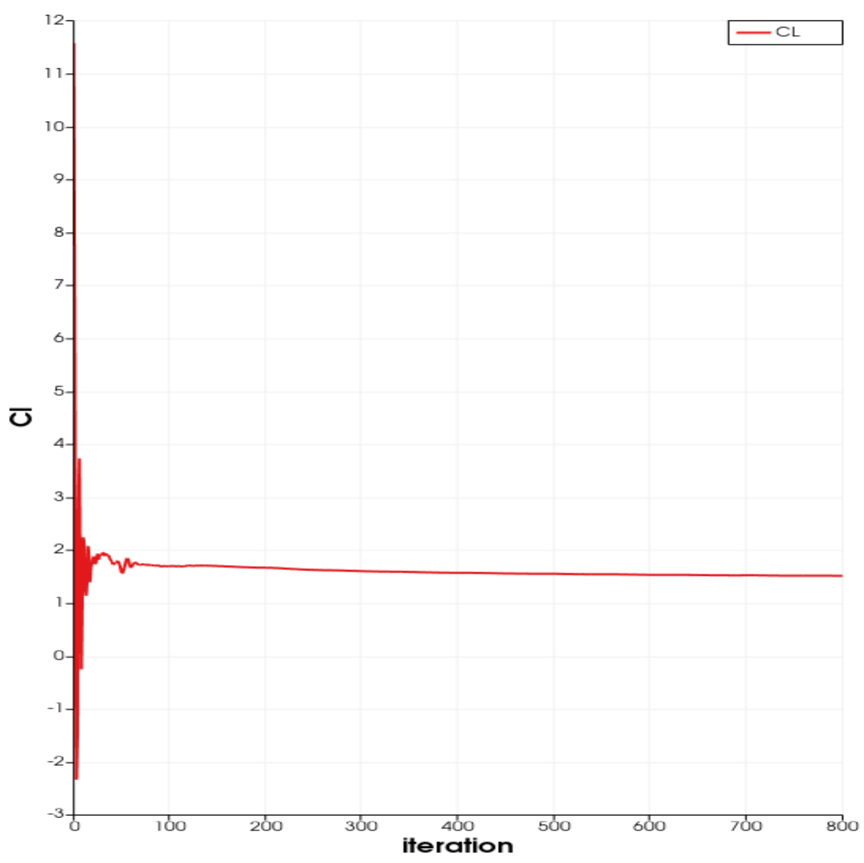
- Slice
- Stream Tracer
- Clip
- Glyph

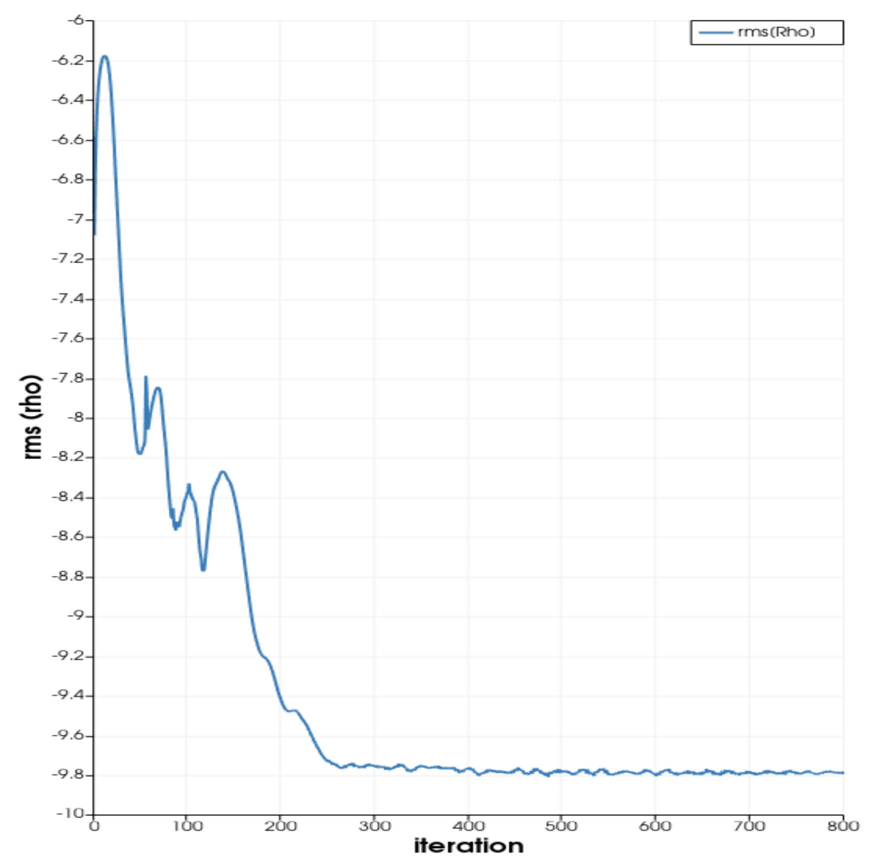




Visualization Test Case Using Paraview

Reading and plotting from csv data:

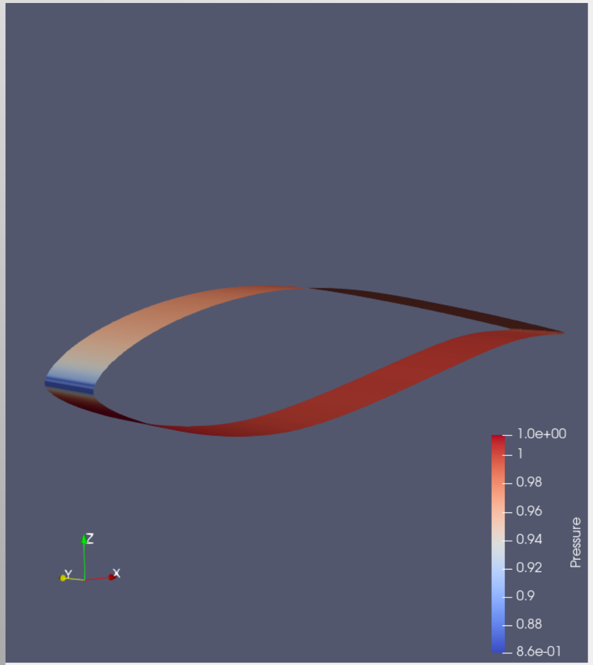


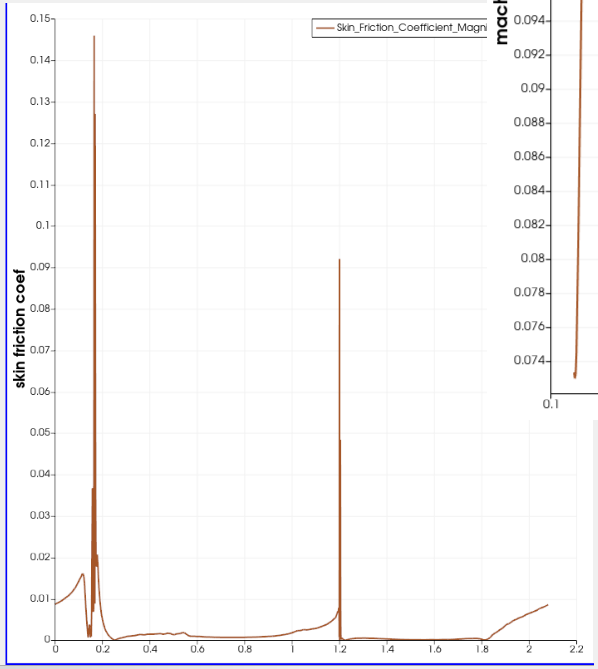


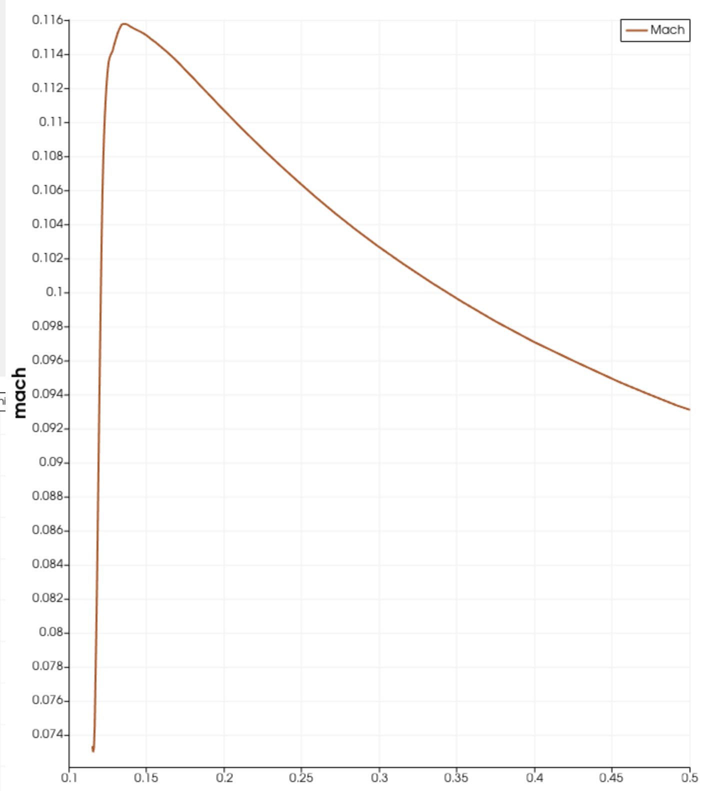
Visualization Test Case Using Paraview

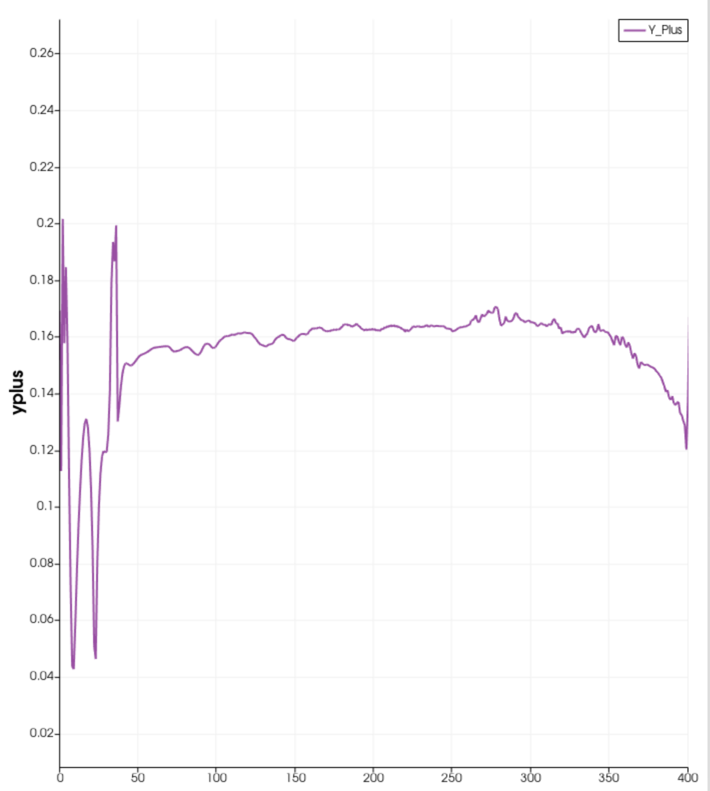
Plotting data from surface files:
- **Plot Data** (2D surface)
- **Plot Over Line** (2D flow)
- **Plot on intersection** (3D surface flow)

Exporting data from surface files:
- Spread sheet View > **Export**







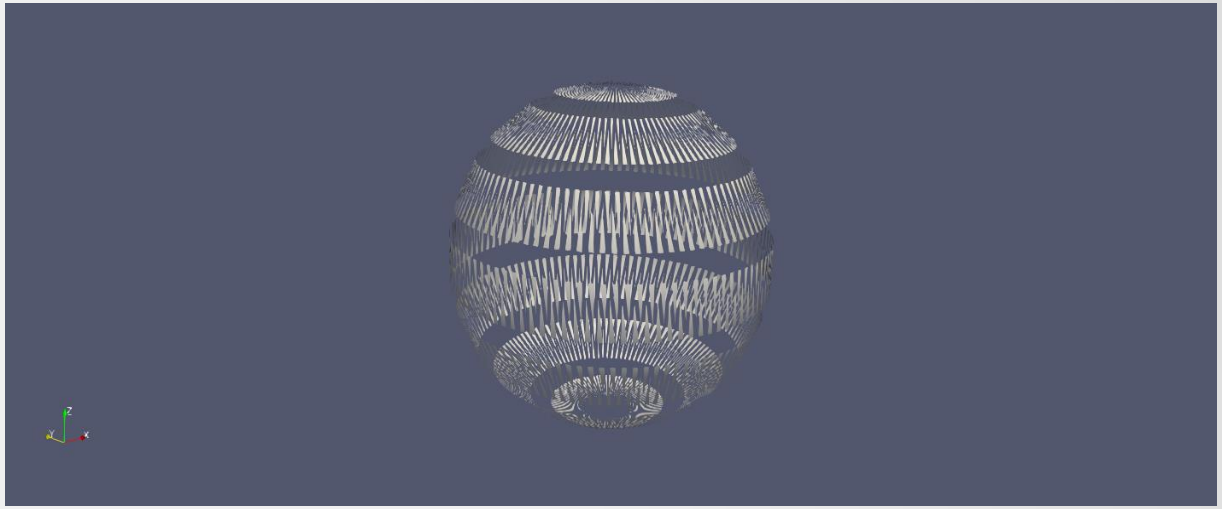


Visualization Test Case Using Paraview

Python bindings for ParaView and VTK that are available in the Python scripting modüle.

Python Scripting:

- Tools > Start Trace
  - `sphere =Sphere()`
  - `sphere.ThetaResolution = 50`
  - `shrink=Shrink()`
  - `Render()`
  - `Show()`



- Tools > Stop Trace
- File > Save as Macro
- Macros > Insert New Macro

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This project has received funding from the European High-Performance Computing Joint Undertaking (JU) under grant agreement No 101101903. The JU receives support from the Digital Europe Programme and Germany, Bulgaria, Austria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Lithuania, Latvia, Poland, Portugal, Romania, Slovenia, Spain, Sweden, France, Netherlands, Belgium, Luxembourg, Slovakia, Norway, Türkiye, Republic of North Macedonia, Iceland, Montenegro, Serbia