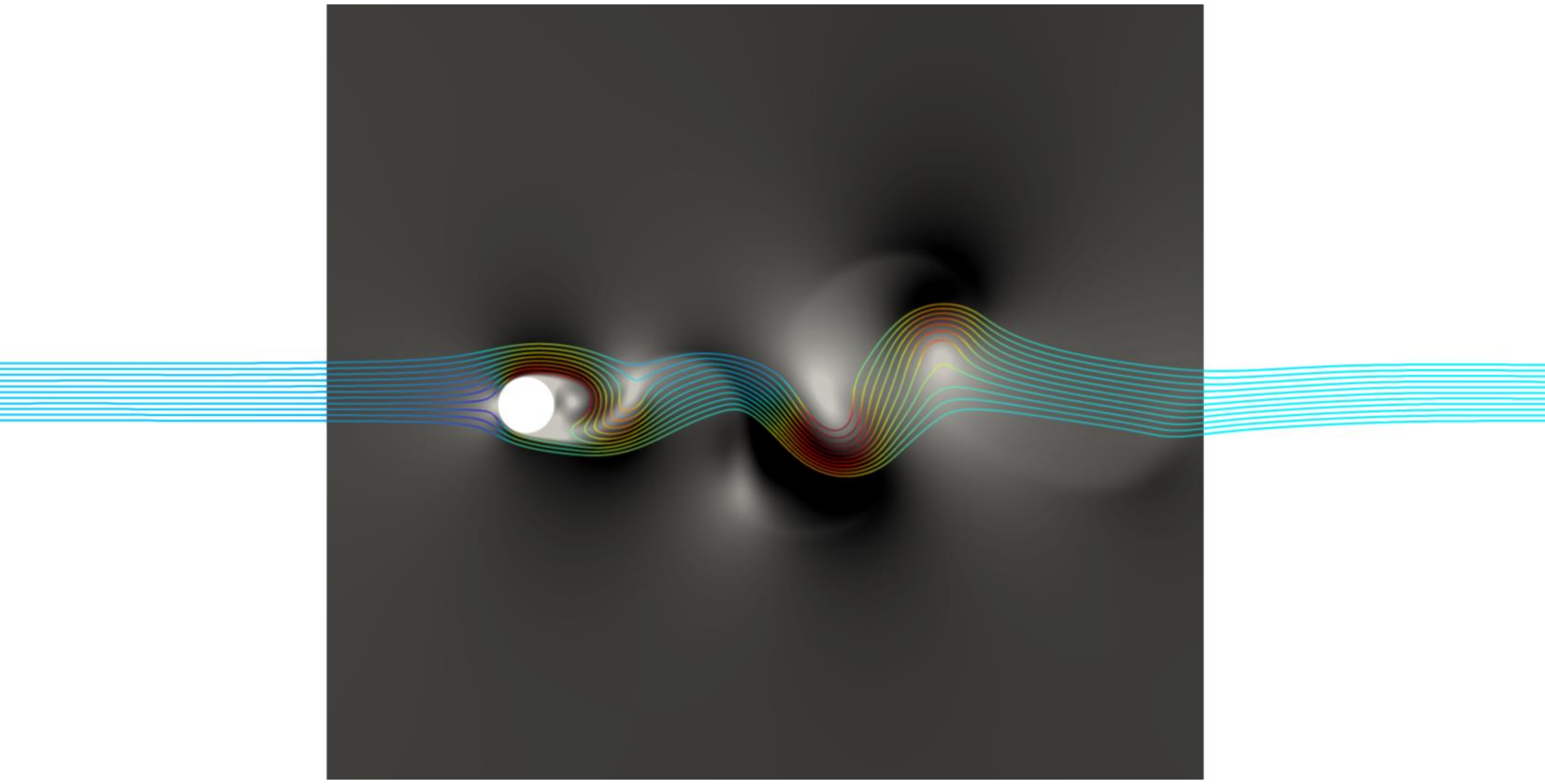
ENGINEERING FLUID DYNAMICS

OpenFOAM® Basic Training



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Compatibility:

- OpenFOAM® v10

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In this OpenFOAM® tutorial series, we have prepared fourteen case examples that are designed to help users to learn the key utilities and features within OpenFOAM®, including mesh generation, multiphase modeling, turbulence modeling, parallel processing and reaction modeling. The base tutorial examples can be imported directly from the OpenFOAM® installation directory or downloaded from our webpage: **www.fluiddynamics.at**.

The tutorials should be primarily used for **OpenFOAM® v10** (Foundation version – www.openfoam.org) but with slight differences, generally applicable to the other flavors of OpenFOAM® such as ESI-version and foam-extend! The structure of each case example follow the below general structure:

0. **Background**: an introduction about the key topics explored in the tutorial and the relevant CFD theory
1. **Pre-processing**: instructions on how to set up the correct case structure for a given problem using base case tutorials, with explanations on relevant dictionaries
2. **Running simulation**: instructions on running the solver and its associated commands
3. **Post-processing**: examining the results in OpenFOAM®'s post-processing application, ParaView V5.10.1

Tutorial One: **Basic Case Setup**

Solver: icoFoam
Geometry: 2-dimensional
Tutorial: elbow

Tutorial Two: **Built in Mesh**

Solver: rhoPimpleFoam
Geometry: 2-dimensional
Tutorial: forwardStep

Tutorial Three: **Patching Fields**

Solver: rhoPimpleFoam
Geometry: 1-dimensional
Tutorial: shockTube

Tutorial Four: **Discretization – Part 1**

Solver: scalarTransportFoam
Geometry: 1-dimensional
Tutorial: shockTube

Tutorial Five: **Discretization – Part 2**

Solver: scalarTransportFoam
Geometry: 2-dimensional
Tutorial: circle

Tutorial Six: **Turbulence, Steady state**

Solver: simpleFoam
Geometry: 2-dimensional
Tutorial: pitzDaily

Tutorial Seven: **Turbulence, Transient**

Solver: pisoFoam
Geometry: 2-dimensional
Tutorial: pitzDaily

Tutorial Eight: **Multiphase - VoF**

Solver: interFoam
Geometry: 2-dimensional
Tutorial: damBreak

Tutorial Nine: **Parallel Processing**

Solver: compressibleInterFoam
Geometry: 3-dimensional
Tutorial: depthCharge3D

Tutorial Ten: **Residence Time Distribution**

Solver: simpleFoam, scalarTransportFoam
Geometry: 3-dimensional
Tutorial: TJunction

Tutorial Eleven: **Reaction**

Solver: reactingFoam
Geometry: 3-dimensional
Tutorial: reactingElbow

Tutorial Twelve: **snappyHexMesh – Single Region**

Solver: snappyHexMesh, scalarTransportFoam
Geometry: 3-dimensional
Tutorial: flange

Tutorial Thirteen: **snappyHexMesh – Multi Region**

Solver: snappyHexMesh, chtMultiRegionFoam
Geometry: 3-dimensional
Tutorial: snappyMultiRegionHeater

Tutorial Fourteen: **Sampling**

Solver: rhoPimpleFoam
Geometry: 3-dimensional
Tutorial: shockTube

Appendix A: **Important Commands in Linux**

Appendix B: **Running OpenFOAM®**

Appendix C: **Frequently Asked Questions (FAQ)**

Appendix D: **ParaView**

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