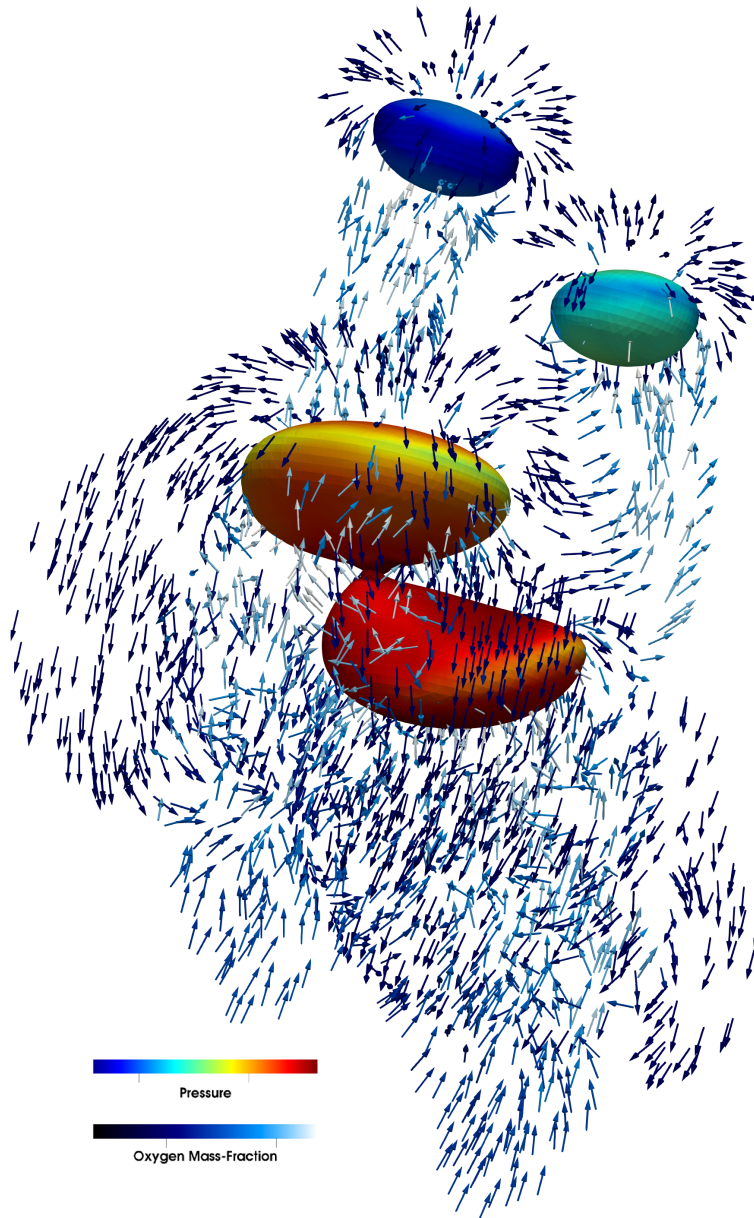


# OpenFOAM<sup>®</sup> Basic Training



5<sup>th</sup> edition, Sep. 2019



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Compatibility:

- OpenFOAM® 7
- OpenFOAM® v1906

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This book has been used as a basis for preparing a series of video lectures  
on youtube by Jozsef Nagy (JKU Linz):

[www.youtube.com/channel/UCjdgpuXuAxH9BqheyE82Vvw](http://www.youtube.com/channel/UCjdgpuXuAxH9BqheyE82Vvw)

(Search for: Jozsef Nagy OpenFOAM at youtube.com)

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.

The tutorials should be primarily used for OpenFOAM® versions 7.0 and v1906, with differences in the running procedure between v1906 and 7.0 highlighted in blue boxes. So, simply ignore the blue boxes if you are running in version 7.0! The structure of each case example follow the below general structure:

- **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 V5.6.0

## Tutorial One: **Basic Case Setup**

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Solver: icoFoam  
Geometry: 2-dimensional  
Tutorial: elbow

## Tutorial Two: **Built in Mesh**

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Solver: rhoPimpleFoam  
Geometry: 2-dimensional  
Tutorial: forwardStep

## Tutorial Three: **Patching Fields**

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Solver: rhoPimpleFoam  
Geometry: 1-dimensional  
Tutorial: shockTube

## Tutorial Four: **Discretization – Part 1**

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Solver: scalarTransportFoam  
Geometry: 1-dimensional  
Tutorial: shockTube

## Tutorial Five: **Discretization – Part 2**

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Solver: scalarTransportFoam  
Geometry: 2-dimensional  
Tutorial: circle

## Tutorial Six: **Turbulence, Steady state**

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Solver: simpleFoam  
Geometry: 2-dimensional  
Tutorial: pitzDaily

## Tutorial Seven: **Turbulence, Transient**

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Solver: pisoFoam  
Geometry: 2-dimensional  
Tutorial: pitzDaily

## Tutorial Eight: **Multiphase**

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Solver: interFoam  
Geometry: 2-dimensional  
Tutorial: damBreak

## Tutorial Nine: **Parallel Processing**

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Solver: compressibleInterFoam  
Geometry: 3-dimensional  
Tutorial: depthCharge3D

## Tutorial Ten: **Residence Time Distribution**

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

## Tutorial Eleven: **Reaction**

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Solver: reactingFoam  
Geometry: 3-dimensional  
Tutorial: reactingElbow

## Tutorial Twelve: **snappyHexMesh – Single Region**

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

## Tutorial Thirteen: **snappyHexMesh – Multi Region**

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

## Tutorial Fourteen: **Sampling**

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Solver: sonicFoam  
Geometry: 3-dimensional  
Tutorial: shockTube

## Appendix A: **Important Commands in Linux**

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## Appendix B: **Running OpenFOAM®**

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

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## Appendix D: **ParaView**

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