UNIVERSITY OF Southampton

Post processing with OpenFOAM

Uttam Cadambi Padmanaban[1]

[1]Department of Engineering
Aerodynamics and Flight Mechanics Group
The University of Southampton

October 17, 2025

Contents

UNIVERSITY OF Southampton

Post processing: the perfect case of better late than never.

[1] Command line post processing

UNIVERSITY OF Southampton

- Post processing allows to estimate quantities that are not directly computed during the simulation.
- Examples include - forces, moments, wall shear stress, yPlus and so on.
- Post processing also allows the user to sample data along lines, planes and different patches.
- OpenFOAM allows for two types of post processing:
  - CLI (command line interface) these are usually for computing turbulence quantities such as Reynolds stresses, wall shear stress, yPlus or even performing operations such as divergence, gradient or curl. This is usually done after the simulation is completed.
  - Runtime. This is done through `controlDict`. This is done when the simulation is running.
- The general syntax is `<turbulence model> -postProcess -func <function_name>`
- Let us look at some common CLI post processing.

Let us look at some examples.

[2] Post processing through `controlDict`

UNIVERSITY OF Southampton

- It is possible to include post processing command in the `controlDict` file.
- This ensures that the post processing is done in run time and not once the simulation is completed.
- In some cases, this may be useful because some quantities require other quantities that are not directly written to disk (instead exist in memory) to perform computations.
- In this case, it is not exactly "post processing" per se.
- There are some quantities that cannot be post processed easily through the CLI such as forces, force coefficients, moments and so on.
- In case you forget to include them before the start of the simulation, it is always possible to write them up in the `controlDict` file after the simulation and run the command `<turbulence model> -postProcess`. This will execute all the post processing commands that have been included in the `controlDict` file.

[2] Post processing through `controlDict`

UNIVERSITY OF Southampton

Let us look at some examples.

[3] Sampling

UNIVERSITY OF Southampton

- OpenFOAM gives fields of quantities of interest (these fields are set to "write" in the source code). This is basically cell-centred qunatities in the entire mesh.
- Sometimes, we need quantities on specific locations - such as lines, boundaries or surfaces.
- The sampling utility is a great way of doing this as a post processing step.
- We will be looking at three different types of sampling methods:
  - Sampling along lines - mean velocity
  - Sampling along surfaces - mean velocity
  - Sampling along patches - wall shear stress