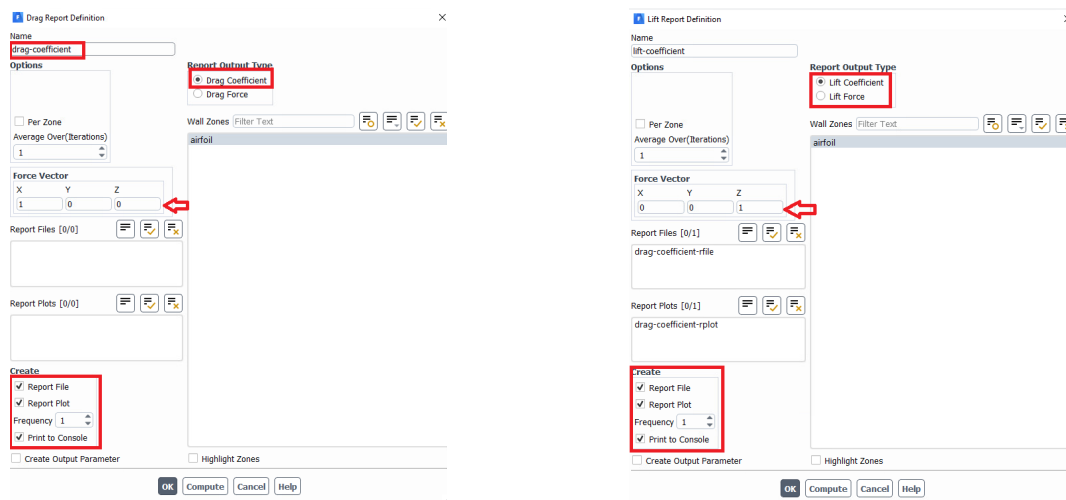


Report Drag and Lift Coefficient

For the flow around an airfoil, as the angle of attack increases, the flow disturbance and wake region at the top of the airfoil increases. After a threshold, the flow gets very unstable such that it affects the pattern of drag and lift coefficients. This behavior is apparent in the related plots shown in Fluent GUI.

In order to report the drag and lift coefficient, follow these steps:

1) Check the pattern of drag and lift coefficients over iterations. To do this, you can check the plots shown in Fluent GUI, or the related output files you defined. At step 3.4 of the Tutorial, you define drag and lift coefficient data to be saved as a File by activating the “Report File”.

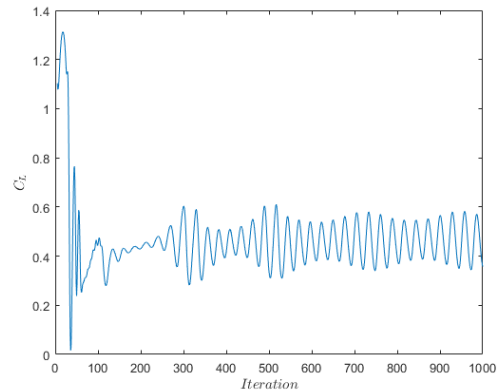
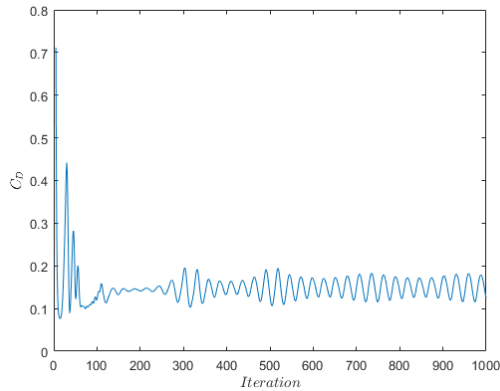


These files are saved in this directory: `~\airfoil_files\dp0\FLU\Fluent`

Go to this directory, you should see two text files named “drag-coefficient.out” and “lift-coefficient.out”, for the drag and lift coefficient data, respectively.

2) If the drag and lift coefficient close to the end of simulation, shows a flat pattern with no oscillation, simply report the final value. To do this, either use the output text files to get the coefficient at the last iteration or follow the instruction given in section 4 of the Tutorial.

3) If the drag and lift coefficient shown in Fluent GUI has a oscillating pattern, refer to the output drag and lift files. You need to get an averaged value close to the end of the simulation, where the output value is fluctuating around a mean value. You may see a pattern similar to the following Figures. As a hint, you may see such oscillating pattern at the angle of attack 12 till 15 degree for the CFD simulation of flow around NACA0012.



Using Matlab, follow these scripts to import the text file and get the averaged value of drag and lift coefficient instead of the final iteration. This should be more accurate than the value at the final iteration.

% Drag and Lift Coefficient output files from Fluent (adjust the name if needed)

```
cd_Fluent = 'cd-coefficient.out'; cl_Fluent = 'cl-coefficient.out';
```

```
delimiterIn = ' ';
```

```
headerlinesIn = 3;
```

```
cd_import = importdata(cd_Fluent,delimiterIn,headerlinesIn);
```

```
cl_import = importdata(cl_Fluent,delimiterIn,headerlinesIn);
```

```
cd_import = cd_import.data'; cl_import = cl_import.data';
```

```
iteration=cd_import(1,:);
```

```
cd=cd_import(2,:); cl=cl_import(2,:);
```

% Average of drag coefficient from iteration 500 to final iteration, Adjust iteration 500 according to the observed pattern in your CFD simulation

```
mean(cd(500:end))
```

```
mean(cl(500:end))
```