Compare

July 16, 2024

0.1 Compararing tail-fin aerodynamics for a simple case

We compare the output of OpenFAST and Fast-V7 for a simple case

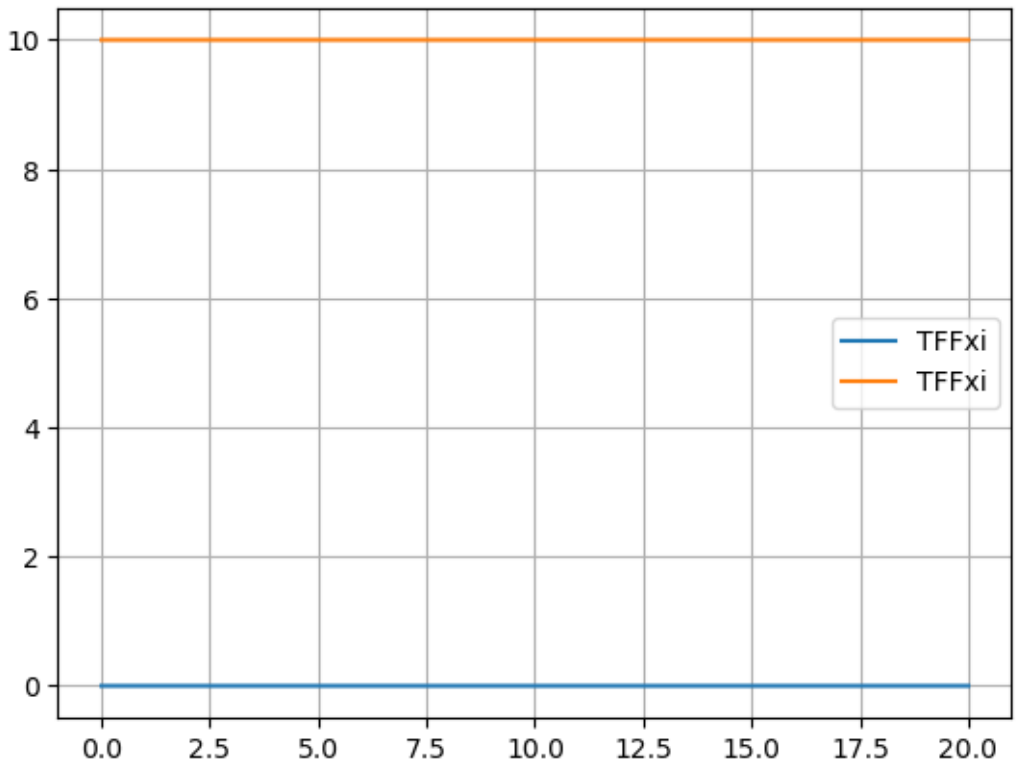
All the flexible and generator DOFs are switched off and yaw angle is fixed to 0 degrees.

Rho = 1
Area = 1
CL (at $\alpha = 0$) = 0.2
CD = 0
V = 10 m/sec steady
Shear = 0

[9]:
```
import matplotlib.pyplot as plt
from openfast_toolbox.io import FASTOutputFile
import os

THISDIR = '/kfs2/projects/rlfarmcontr/Users/agupta/TailFinTestAndy/
 ↪r-test-f-AD14remove_attempt2/glue-codes/openfast/SWRT_YFree_VS_EDG01'
```

0.2 OpenFAST results (as expected)

[10]:
```
df = FASTOutputFile('SWRT_YFree_VS_EDG01_Steady.outb').toDataFrame()
# print(df.columns)

plt.plot(df['Time_[s]'],df['TFFxi_[N]'])
plt.plot(df['Time_[s]'],df['TFFyi_[N]'])
plt.legend(['TFFxi','TFFxi'])

plt.grid()
```



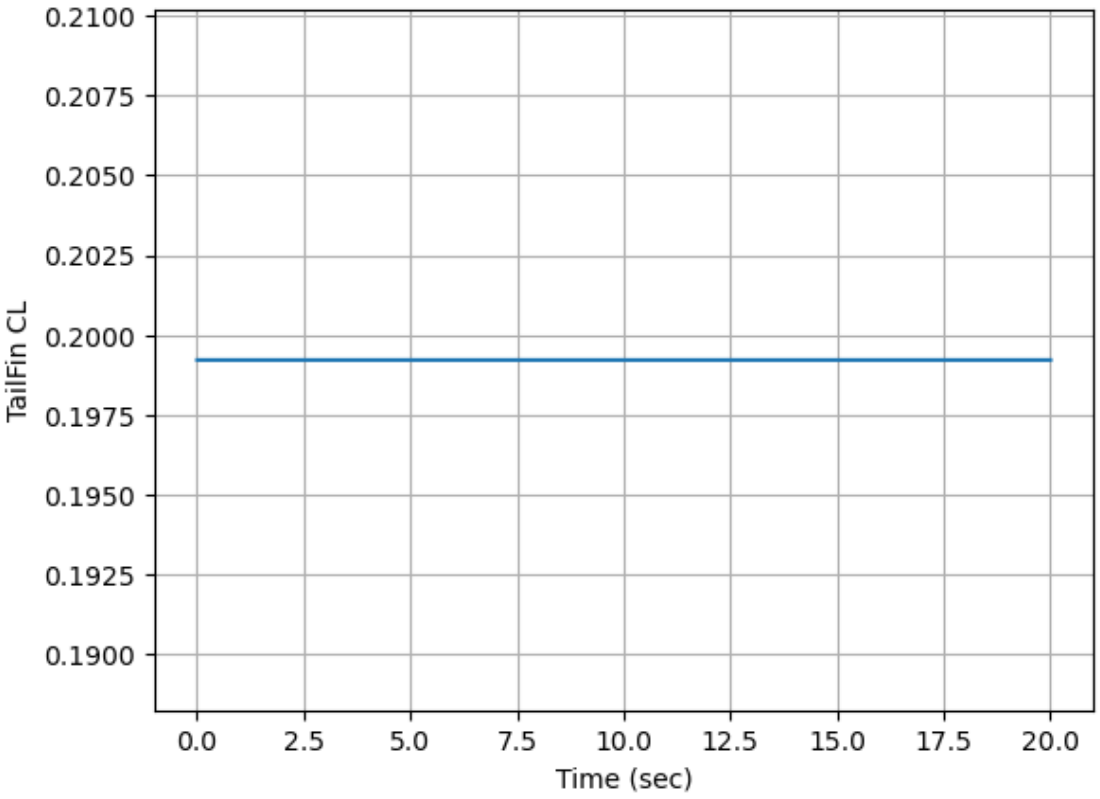
This is correct as the value force should be
0.5 * rho * v^2 * S * CL =
0.5 * 1 * 10^2 * 1 * 0.2 = 10

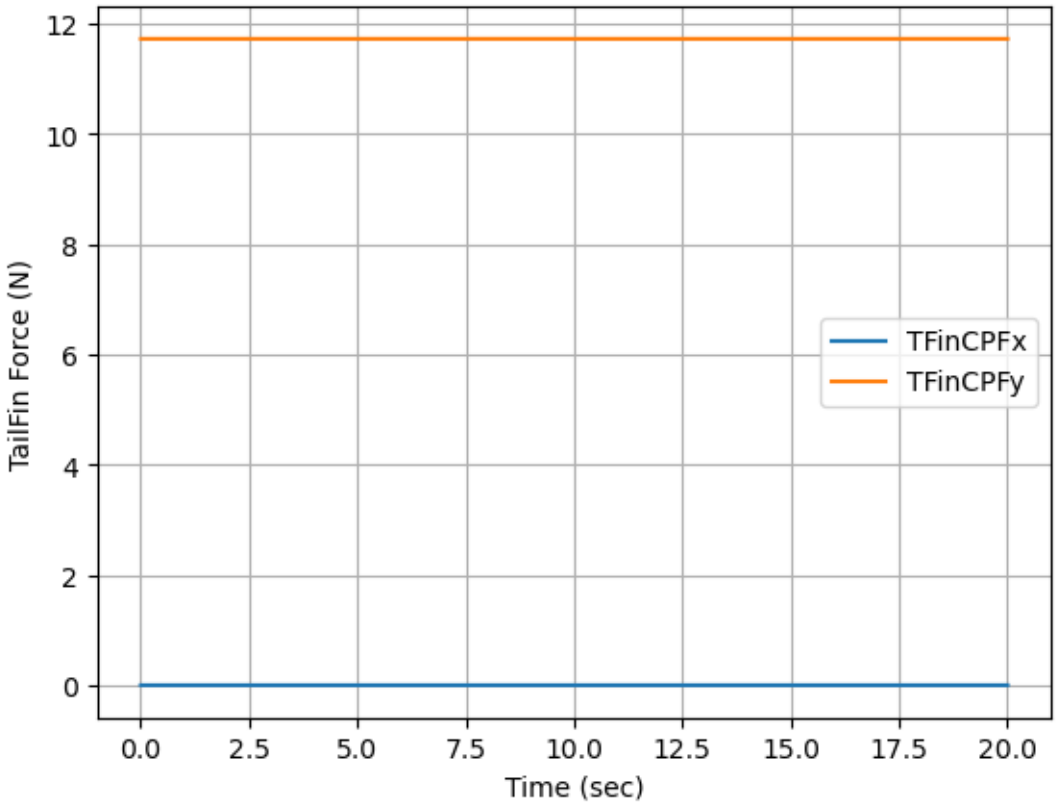
0.3 FAST V7 (Seems to give incorrect output)

[13]:
```
# fv7
file = os.path.join(THISDIR,'SelfStudy','FAST7_Test15','Test15.outb')
df = FASTOutputFile(file).toDataFrame()
# print(df.columns)
```

[15]:
```
# %matplotlib widget

# plt.plot(df['Time_[s]'],np.sqrt((df['TFinCPFy_[kN]']*1000)**2
  ↪+(df['TFinCPFy_[kN]']*1000)**2))
plt.plot(df['Time_[s]'],df['TFinCLift_[-]'])
plt.grid()
plt.ylabel('TailFin CL')
plt.xlabel('Time (sec)')

plt.figure()
plt.plot(df['Time_[s]'],df['TFinCPFx_[kN]']*1000)
```

```
plt.plot(df['Time_[s]'],df['TFinCPFy_[kN]']*1000)
plt.ylabel('TailFin Force (N)')
plt.xlabel('Time (sec)')
plt.grid()
plt.legend(['TFinCPFx','TFinCPFy'])
plt.show()
```





But for some reason, FAST V7 does not seem to present the same output.