compare_solutions

July 12, 2023

[143]:
```
from IPython.display import display, HTML
display(HTML("<style>.container { width:100% !important; }</style>"))
```

```
<IPython.core.display.HTML object>
```

[144]:
```
%%javascript
IPython.OutputArea.prototype._should_scroll = function(lines) {
    return false;
}
```

```
<IPython.core.display.Javascript object>
```

[145]:
```
import matplotlib

matplotlib.rc('xtick', labelsize=25)
matplotlib.rc('ytick', labelsize=25)

font = {'family' : 'sans-serif',
        'weight' : 'bold',
        'size'   : 25}

matplotlib.rc('font', **font)
```

[179]:
```
import numpy as np
import pandas as pd
import matplotlib
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
from scipy import interpolate # https://mljar.com/blog/matplotlib-colors/
import matplotlib.colors as mcolors
import matplotlib.patches as mpatch
```

[204]:
```
#print(mcolors.CSS4_COLORS)
#print(mcolors.TABLEAU_COLORS)
#print(mcolors.XKCD_COLORS)
```

[214]:
```
overlap = {name for name in mcolors.CSS4_COLORS if f'xkcd:{name}' in mcolors.
 ↪XKCD_COLORS}
for j, color_name in enumerate(sorted(overlap)):
    print(j, color_name)
    css4 = mcolors.CSS4_COLORS[color_name]
    xkcd = mcolors.XKCD_COLORS[f'xkcd:{color_name}'].upper()
    rgba = mcolors.to_rgba_array([css4, xkcd])
    luma = 0.299 * rgba[:, 0] + 0.587 * rgba[:, 1] + 0.114 * rgba[:, 2]
    css4_text_color = 'k' if luma[0] > 0.5 else 'w'
    xkcd_text_color = 'k' if luma[1] > 0.5 else 'w'
```

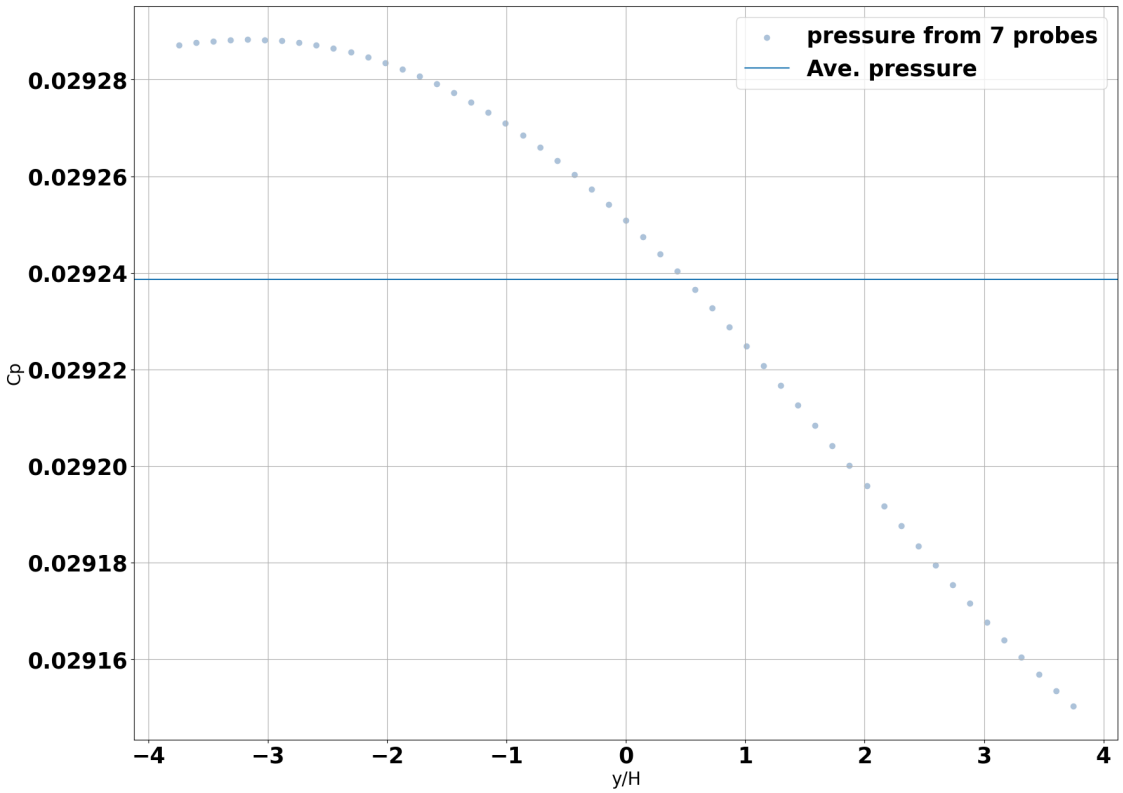
```
0 aqua
1 aquamarine
2 azure
3 beige
4 black
5 blue
6 brown
7 chartreuse
8 chocolate
9 coral
10 crimson
11 cyan
12 darkblue
13 darkgreen
14 fuchsia
15 gold
16 goldenrod
17 green
18 grey
19 indigo
20 ivory
21 khaki
22 lavender
23 lightblue
24 lightgreen
25 lime
26 magenta
27 maroon
28 navy
29 olive
30 orange
31 orangered
32 orchid
33 pink
34 plum
35 purple
```

```
36 red
37 salmon
38 sienna
39 silver
40 tan
41 teal
42 tomato
43 turquoise
44 violet
45 wheat
46 white
47 yellow
48 yellowgreen
```

[184]:
```
# compute average pressure from seven pressure probes
y, p = np.loadtxt('../04_Simulation/
 ↪VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k/
 ↪postProcessing/sampleDict/110000//seven_probes_loc_ave_p_ref_cal_k_p.xy',␣
 ↪usecols=(0, 2), unpack=True)

fig = plt.figure(figsize=(20,15))
plt.scatter(y,p, label='pressure from 7 probes', c='#acc2d9')
plt.axhline(y=p.mean(), label='Ave. pressure')
plt.xlabel('y/H', fontsize=20)
plt.ylabel('Cp',  fontsize=20)
plt.legend()
plt.grid()
plt.show()
plt.close()

print(p)
print('Average Reference Pressure =', p.mean())
```




```
[0.02928715 0.02928764 0.029288   0.02928822 0.0292883  0.02928823
 0.02928802 0.02928765 0.02928714 0.02928647 0.02928565 0.02928466
 0.02928352 0.02928222 0.02928075 0.02927911 0.02927731 0.02927535
 0.02927323 0.02927095 0.02926852 0.02926593 0.02926319 0.02926031
 0.02925729 0.02925413 0.02925085 0.02924744 0.02924392 0.02924029
 0.02923656 0.02923274 0.02922884 0.02922486 0.02922082 0.02921674
 0.02921261 0.02920845 0.02920427 0.02920009 0.02919591 0.02919174
 0.0291876  0.0291835  0.02917945 0.02917547 0.02917156 0.02916773
 0.029164   0.02916039 0.02915689 0.02915352 0.02915029]
Average Reference Pressure = 0.0292385930754717
```

[148]:
```
# Freestream values (required to compute Cp)
pref   = p.mean()
rhoinf = 1.0
uinf   = 1.0
```

[149]:
```
# Load VT experimental data
Cp_vs_x_H = pd.read_csv("../02_Data/Cp_vs_x_H.csv")
Cp_vs_z_H = pd.read_csv("../02_Data/Cp_vs_z_H.csv")
```

[150]:
```
# 01.␣
↪VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k
```

```
# 02.␣
 ↪VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k
# 03.␣
 ↪VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k
# 04.␣
 ↪VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON
# 05.␣
 ↪VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF
# 06.␣
 ↪VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON
# 07.␣
 ↪VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k
# 08. BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping
# 09. BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM-L2-MC  (SC)
# 10. BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM-L2-MC  (SC)
# 11. BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM-L2-MC   (SC)
# 12. BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE-MO-52 (PH)
# 13. BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE-MO-52  (PH)
# 14. BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE-MO-52 (PH)
# 15. BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON
# 16. BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF
# 17. BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON
# 18. BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF
# 19. BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE-MO-52
```

[151]:
```
base = '../04_Simulation/' # 01
testcase =␣
 ↪'VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k/
 ↪'
df_BSL_Set3L4_FloorSliceX_0 = pd.read_csv(base+testcase+'FloorSliceX_0.csv')
df_BSL_Set3L4_FloorSliceZ_0 = pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceX_0␣
 ↪= pd.read_csv(base+testcase+'FloorSliceX_0.csv')
VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceZ_0␣
 ↪= pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[152]:
```
base = '../04_Simulation/' # 02
testcase =␣
 ↪'VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k/
 ↪'
df_BSL_11M_FloorSliceX_0 = pd.read_csv(base+testcase+'FloorSliceX_0.csv')
df_BSL_11M_FloorSliceZ_0 = pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSliceX_0␣
 ↪= pd.read_csv(base+testcase+'FloorSliceX_0.csv')
VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSliceZ_0␣
 ↪= pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[153]:
```
base = '../04_Simulation/' #03
testcase =␣
 ↪'VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k/
 ↪'
df_GEP_Set3L4_FloorSliceX_0 = pd.read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0 = pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceX_0␣
 ↪= pd.read_csv(base+testcase+'FloorSliceX_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceZ_0␣
 ↪= pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[154]:
```
base = '../04_Simulation/' # 04
testcase =␣
 ↪'VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON/
 ↪'
df_GEP_aij_ON_Rij_ON_11M_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_aij_ON_Rij_ON_11M_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_FloorSliceX_0
 ↪= pd.read_csv(base+testcase+'FloorSliceX_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_FloorSliceZ_0
 ↪= pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[155]:
```
base = '../04_Simulation/' # 05
testcase =␣
 ↪'VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF/
 ↪'
df_GEP_aij_ON_Rij_OFF_11M_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_aij_ON_Rij_OFF_11M_FloorSliceZ_0 = pd.read_csv(base+testcase+'/
 ↪FloorSliceZ_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_FloorSliceX_
 ↪= pd.read_csv(base+testcase+'FloorSliceX_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_FloorSliceZ_
 ↪= pd.read_csv(base+testcase+'/FloorSliceZ_0.csv')
```

[156]:
```
base = '../04_Simulation/' # 06
testcase =␣
 ↪'VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON/
 ↪'
df_GEP_aij_OFF_Rij_ON_11M_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_aij_OFF_Rij_ON_11M_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
```

```
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_FloorSliceX_
 ↪= pd.read_csv(base+testcase+'FloorSliceX_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_FloorSliceZ_
 ↪= pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[157]:
```
base = '../04_Simulation/' # 07
testcase =␣
 ↪'VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k/
 ↪'
df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k_Floo
 ↪= pd.read_csv(base+testcase+'FloorSliceX_0.csv')
VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k_Floo
 ↪= pd.read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[158]:
```
base = '../04_Simulation/45deg/L4/BSL/' # 08
testcase = 'BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping/'
df_BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[159]:
```
base = '../04_Simulation/45deg/L4/GEP/Fabians_models/SC/'
# 09
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM-L2-MC/
 ↪FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM-L2-MC/
 ↪FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceX_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM-L2-MC/
 ↪FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceZ_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM-L2-MC/
 ↪FloorSliceZ_0.csv')
# 10
```

```
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM-L2-MC/
 ↪FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM-L2-MC/
 ↪FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceX_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM-L2-MC/
 ↪FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceZ_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM-L2-MC/
 ↪FloorSliceZ_0.csv')
# 11
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM-L2-MC/
 ↪FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM-L2-MC/
 ↪FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceX_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM-L2-MC/
 ↪FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceZ_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM-L2-MC/
 ↪FloorSliceZ_0.csv')
```

[160]:
```
base = '../04_Simulation/45deg/L4/GEP/Fabians_models/PH/'
# 12
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE-MO-52/
 ↪FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE-MO-52/
 ↪FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceX_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE-MO-52/
 ↪FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceZ_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE-MO-52/
 ↪FloorSliceZ_0.csv')
# 13
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE-MO-52/
 ↪FloorSliceX_0.csv')
```

```
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE-MO-52/
 ↪FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE-MO-52/
 ↪FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE-MO-52/
 ↪FloorSliceZ_0.csv')
# 14
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE-MO-52/
 ↪FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52␣
 ↪= pd.read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE-MO-52/
 ↪FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceX_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE-MO-52/
 ↪FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceZ_0 = pd.
 ↪read_csv(base+'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE-MO-52/
 ↪FloorSliceZ_0.csv')
```

[161]:
```
base     = '../04_Simulation/45deg/L4/GEP/' # 15
testcase = 'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON/'
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')

base     = '../04_Simulation/45deg/L4/GEP/' # 16
testcase = 'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF/'
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF = pd.
 ↪read_csv(base+testcase+'/FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')

base     = '../04_Simulation/45deg/L4/GEP/' # 17
```

```
testcase = 'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON/'
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')

base     = '../04_Simulation/45deg/L4/GEP/' # 18
testcase = 'BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF/'
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[162]:
```
base     = '../04_Simulation/45deg/L4/GEP/Fabians_models/blend_PH_SC/' # 19
testcase = 'BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE-MO-52/'
df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_blend_PH_SC = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_blend_PH_SC = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceX_0.csv')
BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0 = pd.
 ↪read_csv(base+testcase+'FloorSliceZ_0.csv')
```

[200]:
```
#fig = plt.figure(figsize=(30,15))
#
#plt.scatter(Cp_vs_x_H['x/H'],
 ↪    Cp_vs_x_H['Cp'],
 ↪                    c = 'k',      label = 'VT Exp.', s = 100)
#
#plt.scatter(df_BSL_11M_FloorSliceZ_0['Points:0'],
 ↪    (df_BSL_11M_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf),
 ↪                    c='magenta', label='BSL_11M')
#
#plt.scatter(df_BSL_Set3L4_FloorSliceZ_0['Points:0'],
 ↪    (df_BSL_Set3L4_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf),
 ↪                    c='green',    label='BSL_Set3L4')
#
```

```
#plt.scatter(df_GEP_Set3L4_FloorSliceZ_0['Points:0'],
 ↪    (df_GEP_Set3L4_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf),
 ↪                    c='red',     label='GEP_Set3L4')
#
#plt.scatter(df_GEP_aij_ON_Rij_ON_11M_FloorSliceZ_0['Points:0'],
 ↪    (df_GEP_aij_ON_Rij_ON_11M_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                    c='blue',
 ↪label='GEP_aij_ON_Rij_ON_11M')
#
#plt.scatter(df_GEP_aij_ON_Rij_OFF_11M_FloorSliceZ_0['Points:0'],
 ↪    (df_GEP_aij_ON_Rij_OFF_11M_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                    c='orange',
 ↪label='GEP_aij_ON_Rij_OFF_11M')
#
#plt.scatter(df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceZ_0['Points:0'],
 ↪    (df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),              c='pink',
 ↪label='GEP_aij_ON_Rij_OFF_11M_run0')
#
#plt.scatter(df_GEP_aij_OFF_Rij_ON_11M_FloorSliceZ_0['Points:0'],
 ↪    (df_GEP_aij_OFF_Rij_ON_11M_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                    c='yellow',
 ↪label='GEP_aij_OFF_Rij_ON_11M')
#
#plt.scatter(df_BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0['Points:
 ↪0'], (df_BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='brown',   label='BSL_no_mapping')
#
#plt.xlabel('x/H', fontsize=20)
#plt.ylabel('Cp',  fontsize=20)
#plt.xlim([-8, 8])
#plt.ylim([-0.9, 0.5])
#plt.grid()
#plt.legend(fontsize=20)
#plt.show()
#plt.close()
```

[201]:
```
#fig = plt.figure(figsize=(30,15))
#
#plt.scatter(Cp_vs_z_H['z/H'],
 ↪    Cp_vs_z_H['Cp'],
 ↪                    c = 'k',     label = 'VT Exp.', s = 100)
#
#plt.scatter(df_BSL_11M_FloorSliceX_0['Points:2'],
 ↪    (df_BSL_11M_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf),
 ↪                    c='magenta', label='BSL_11M')
```

```
#
#plt.scatter(df_BSL_Set3L4_FloorSliceX_0['Points:2'],
 ↪    (df_BSL_Set3L4_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf),
 ↪                    c='green',   label='BSL_Set3L4')
#
#plt.scatter(df_GEP_Set3L4_FloorSliceX_0['Points:2'],
 ↪    (df_GEP_Set3L4_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf),
 ↪                    c='red',     label='GEP_Set3L4')
#
#plt.scatter(df_GEP_aij_ON_Rij_ON_11M_FloorSliceX_0['Points:2'],
 ↪    (df_GEP_aij_ON_Rij_ON_11M_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                    c='blue',
 ↪label='GEP_aij_ON_Rij_ON_11M')
#
#plt.scatter(df_GEP_aij_ON_Rij_OFF_11M_FloorSliceX_0['Points:2'],
 ↪    (df_GEP_aij_ON_Rij_OFF_11M_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                   c='orange',
 ↪label='GEP_aij_ON_Rij_OFF_11M')
#
#plt.scatter(df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceX_0['Points:2'],
 ↪    (df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),               c='pink',
 ↪label='GEP_aij_ON_Rij_OFF_11M_run0')
#
#plt.scatter(df_GEP_aij_OFF_Rij_ON_11M_FloorSliceX_0['Points:2'],
 ↪    (df_GEP_aij_OFF_Rij_ON_11M_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                   c='yellow',
 ↪label='GEP_aij_OFF_Rij_ON_11M')
#
#plt.scatter(df_BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0['Points:
 ↪2'], (df_BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='brown',   label='BSL_no_mapping')
#
#plt.xlabel('z/H', fontsize=20)
#plt.ylabel('Cp',  fontsize=20)
#plt.xlim([-4, 4])
#plt.ylim([-1.8, 0])
#plt.grid()
#plt.legend(fontsize=20)
#plt.show()
#plt.close()
```

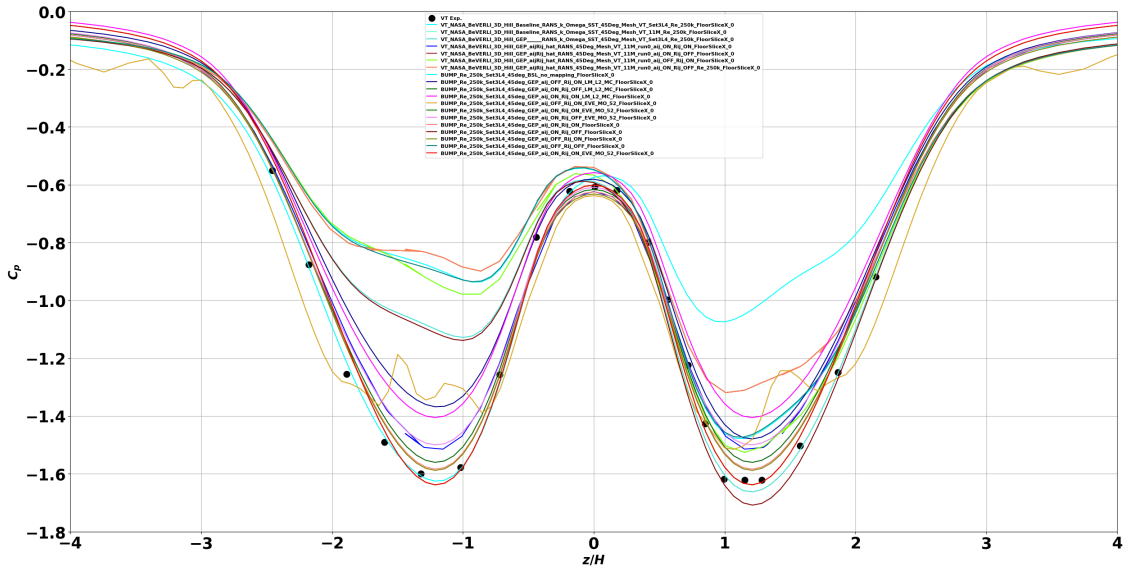
1 Plot C_p along centerspan ($x = 0$) plane

[230]:
```
fig = plt.figure(figsize=(30,15))
# 00 Exp. data
plt.scatter(Cp_vs_z_H['z/H'],
 ↪                                                    Cp_vs_z_H['Cp'],
 ↪
 ↪                                    c = 'k',
 ↪label='VT Exp.', s=100)
# 01
plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorS
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceX
 ↪(0.5*rhoinf*uinf*uinf),            c=mcolors.CSS4_COLORS['aqua'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
# 02
plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSlic
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSliceX_0[
 ↪(0.5*rhoinf*uinf*uinf),               c=mcolors.CSS4_COLORS['aquamarine'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSli
# 03
plt.
 ↪plot(VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSl
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceX
 ↪(0.5*rhoinf*uinf*uinf),            c=mcolors.CSS4_COLORS['turquoise'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
# 04
plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Floo
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_FloorSlic
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['blue'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Flo
# 05
plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Flo
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_FloorSli
 ↪(0.5*rhoinf*uinf*uinf),         c=mcolors.CSS4_COLORS['brown'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Fl
# 06
```

```
plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_Flo
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_FloorSli
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['chartreuse'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_Fl
# 07
plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k_
 ↪(0.5*rhoinf*uinf*uinf), c=mcolors.CSS4_COLORS['coral'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re
# 08
plt.plot(-BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0['Points:2'],
 ↪
 ↪(BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),
 ↪c=mcolors.CSS4_COLORS['cyan'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0')
# 09
plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['darkblue'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceX_0')
# 10
plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['darkgreen'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceX_0')
# 11
plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                     c=mcolors.
 ↪CSS4_COLORS['fuchsia'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceX_0')
# 12
```

```
plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceX_0['Points:
 ↪2'],                                        ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['goldenrod'], ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceX_0')
# 13
plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['Points:
 ↪2'],                                        ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                     c=mcolors.
 ↪CSS4_COLORS['green'],     ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0')
# 14
plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceX_0['Points:
 ↪2'],                                        ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['violet'],    ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceX_0')
# 15
plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceX_0['Points:
 ↪2'],                                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                c=mcolors.
 ↪CSS4_COLORS['salmon'],    ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceX_0')
# 16
plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceX_0['Points:
 ↪2'],                                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                c=mcolors.
 ↪CSS4_COLORS['maroon'],    ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceX_0')
# 17
plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceX_0['Points:
 ↪2'],                                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                c=mcolors.
 ↪CSS4_COLORS['olive'],     ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceX_0')
# 18
```

```
plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceX_0['Points:
  ↪2'],                                                          ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceX_0['p']-pref)/(0.
  ↪5*rhoinf*uinf*uinf),                                                  c=mcolors.
  ↪CSS4_COLORS['teal'],       ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceX_0')
# 19
plt.
  ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['Points:
  ↪2'],                                                          ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['p']-pref)/
  ↪(0.5*rhoinf*uinf*uinf),                                               c=mcolors.
  ↪CSS4_COLORS['red'],       ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0')
#
plt.xlabel('$z/H$', fontsize=20)
plt.ylabel('$C_p$', fontsize=20)
plt.xlim([-4, 4])
plt.ylim([-1.8, 0])
plt.grid()
plt.legend(fontsize=8)
plt.savefig('BH_Cp_X.pdf')
plt.show()
plt.close()
```



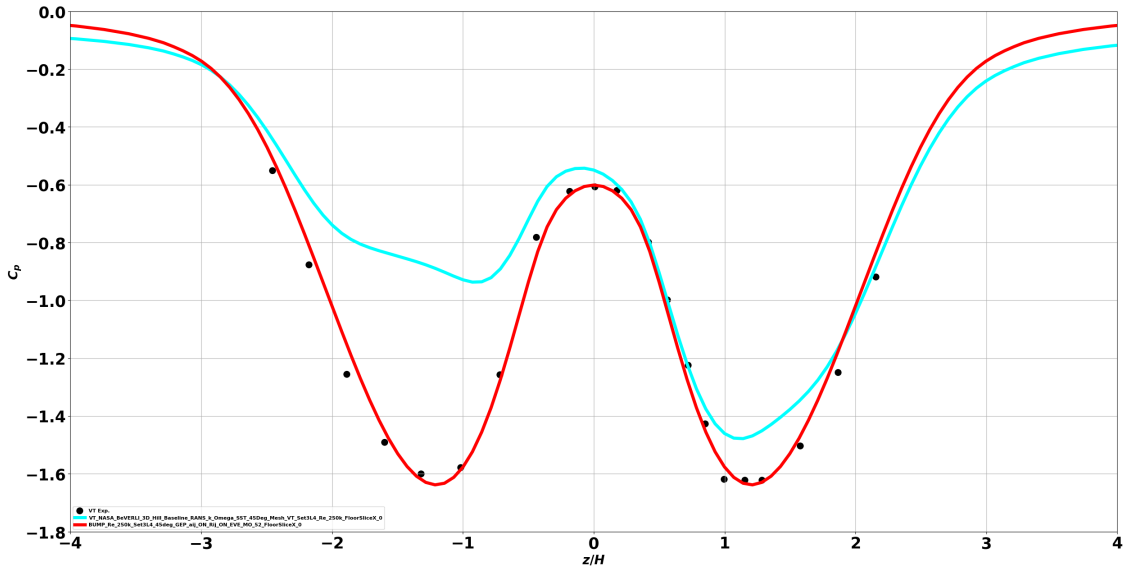
[243]:
```
fig = plt.figure(figsize=(30,15))
# 00 Exp. data
```

```
plt.scatter(Cp_vs_z_H['z/H'],                                                                        ␣
↪                                              Cp_vs_z_H['Cp'],                                      ␣
↪                                                                                                    ␣
↪                                   c = 'k',                                                  ␣
↪label='VT Exp.', s=100)
# 01
plt.
↪plot(-VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorS
↪2'],             ␣
↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceX
↪(0.5*rhoinf*uinf*uinf),           c=mcolors.CSS4_COLORS['aqua'],      ␣
↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
↪linewidth=5)
## 02
#plt.
↪plot(-VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSlic
↪2'],                ␣
↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSliceX_0[
↪(0.5*rhoinf*uinf*uinf),              c=mcolors.CSS4_COLORS['aquamarine'],␣
↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSli
## 03
#plt.
↪plot(VT_NASA_BeVERLI_3D_Hill_GEP______RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSl
↪2'],              ␣
↪(VT_NASA_BeVERLI_3D_Hill_GEP______RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceX
↪(0.5*rhoinf*uinf*uinf),           c=mcolors.CSS4_COLORS['turquoise'], ␣
↪label='VT_NASA_BeVERLI_3D_Hill_GEP______RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
## 04
#plt.
↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Floo
↪2'],         ␣
↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_FloorSlic
↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['blue'],       ␣
↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Flo
## 05
#plt.
↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Flo
↪2'],        ␣
↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_FloorSli
↪(0.5*rhoinf*uinf*uinf),         c=mcolors.CSS4_COLORS['brown'],      ␣
↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Fl
## 06
```

```
#plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_Flo
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_FloorSli
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['chartreuse'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_Fl
## 07
#plt.
 ↪plot(-VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_
 ↪2'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k_
 ↪(0.5*rhoinf*uinf*uinf), c=mcolors.CSS4_COLORS['coral'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re
## 08
#plt.plot(-BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0['Points:2'],
 ↪
 ↪(BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),
 ↪c=mcolors.CSS4_COLORS['cyan'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceX_0')
## 09
#plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['darkblue'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceX_0')
## 10
#plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['darkgreen'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceX_0')
## 11
#plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                     c=mcolors.
 ↪CSS4_COLORS['fuchsia'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceX_0')
## 12
```

```
#plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['goldenrod'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceX_0')
## 13
#plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                     c=mcolors.
 ↪CSS4_COLORS['green'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0')
## 14
#plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['violet'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceX_0')
## 15
#plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                          c=mcolors.
 ↪CSS4_COLORS['salmon'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceX_0')
## 16
#plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                        c=mcolors.
 ↪CSS4_COLORS['maroon'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceX_0')
## 17
#plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceX_0['Points:
 ↪2'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                        c=mcolors.
 ↪CSS4_COLORS['olive'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceX_0')
## 18
```

```
#plt.plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceX_0['Points:
 ↪2'],                                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                          c=mcolors.
 ↪CSS4_COLORS['teal'],       ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceX_0')
# 19
plt.
 ↪plot(-BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['Points:
 ↪2'],                                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                       c=mcolors.
 ↪CSS4_COLORS['red'],       ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceX_0',␣
 ↪linewidth=5)
#
plt.xlabel('$z/H$', fontsize=20)
plt.ylabel('$C_p$', fontsize=20)
plt.xlim([-4, 4])
plt.ylim([-1.8, 0])
plt.grid()
plt.legend(fontsize=8)
plt.savefig('BH_Cp_X.pdf')
plt.show()
plt.close()
```



[231]:
```
#fig = plt.figure(figsize=(30,15))
##
```

```
#plt.scatter(Cp_vs_z_H['z/H'], Cp_vs_z_H['Cp'], s = 100, c = 'k', label = 'VT␣
 ↪Exp.')
##
#plt.plot(-df_BSL_11M_FloorSliceX_0['Points:2'],␣
 ↪(df_BSL_11M_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf), c='magenta',␣
 ↪label='BSL_11M')
##
#plt.plot(-df_BSL_Set3L4_FloorSliceX_0['Points:2'],␣
 ↪(df_BSL_Set3L4_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf), c='red',␣
 ↪linestyle='--', label='kOmegaSST-BSL', linewidth=5) #BSL_Set3L4
##
#plt.plot(df_GEP_Set3L4_FloorSliceX_0['Points:2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf), c='red',␣
 ↪label='GEP_Set3L4')
##
#plt.scatter(-df_GEP_aij_ON_Rij_ON_11M_FloorSliceX_0['Points:2'],␣
 ↪(df_GEP_aij_ON_Rij_ON_11M_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf),␣
 ↪c='blue', label='GEP_aij_ON_Rij_ON_11M')
##
#plt.scatter(-df_GEP_aij_ON_Rij_OFF_11M_FloorSliceX_0['Points:2'],␣
 ↪(df_GEP_aij_ON_Rij_OFF_11M_FloorSliceX_0['p']-pref)/(0.5*rhoinf*uinf*uinf),␣
 ↪c='orange', label='GEP_aij_ON_Rij_OFF_11M')
##
#plt.scatter(-df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceX_0['Points:2'],␣
 ↪(df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceX_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf), c='pink', label='GEP_aij_ON_Rij_OFF_11M_run0')
##
###plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC['Po
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC['p']-pre
 ↪(0.5*rhoinf*uinf*uinf), c='red', label='GEP_aij_OFF_Rij_ON_LM_L2_MC')
###plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC['Po
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC['p']-pre
 ↪(0.5*rhoinf*uinf*uinf), c='blue', label='GEP_aij_ON_Rij_OFF_LM_L2_MC')
###plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC['Poi
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC['p']-pref
 ↪(0.5*rhoinf*uinf*uinf), c='green', label='GEP_aij_ON_Rij_ON_LM_L2_MC')
##
```

```
#plt.
 ↪scatter(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52['p']-pr
 ↪(0.5*rhoinf*uinf*uinf), c='yellow', label='GEP_aij_OFF_Rij_ON_EVE_MO_52')
###plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52['Po
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52['p']-pre
 ↪(0.5*rhoinf*uinf*uinf), c='violet', label='GEP_aij_ON_Rij_ON_EVE_MO_52')
###plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52['P
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52['p']-pr
 ↪(0.5*rhoinf*uinf*uinf), c='orange', label='GEP_aij_ON_Rij_OFF_EVE_MO_52')
##
#plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON['Points:
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='grey', label='GEP_aij_ON_Rij_ON')
#plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF['Points:
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='lime', label='GEP_aij_ON_Rij_OFF')
#plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF['Points:
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='green', label='GEP_aij_OFF_Rij_OFF')
#plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON['Points:
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='blue', label='GEP_aij_OFF_Rij_ON')
##
#plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_blend_PH_SC['Points:
 ↪2'],␣
 ↪(df_GEP_Set3L4_FloorSliceX_0_BUMP_Re_250k_Set3L4_45deg_GEP_blend_PH_SC['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='green', label='kOmegaSST-GEP_blend_PH_WMSC',␣
 ↪linewidth=5)
##
#plt.xlabel('$z/H$', fontsize=20)
#plt.ylabel('$C_p$', fontsize=20)
```

```
#plt.xlim([-4, 4])
#plt.ylim([-1.8, 0])
#plt.grid()
#plt.legend(fontsize=20)
#plt.savefig('BH_Cp_X.pdf')
#plt.show()
#plt.close()
```

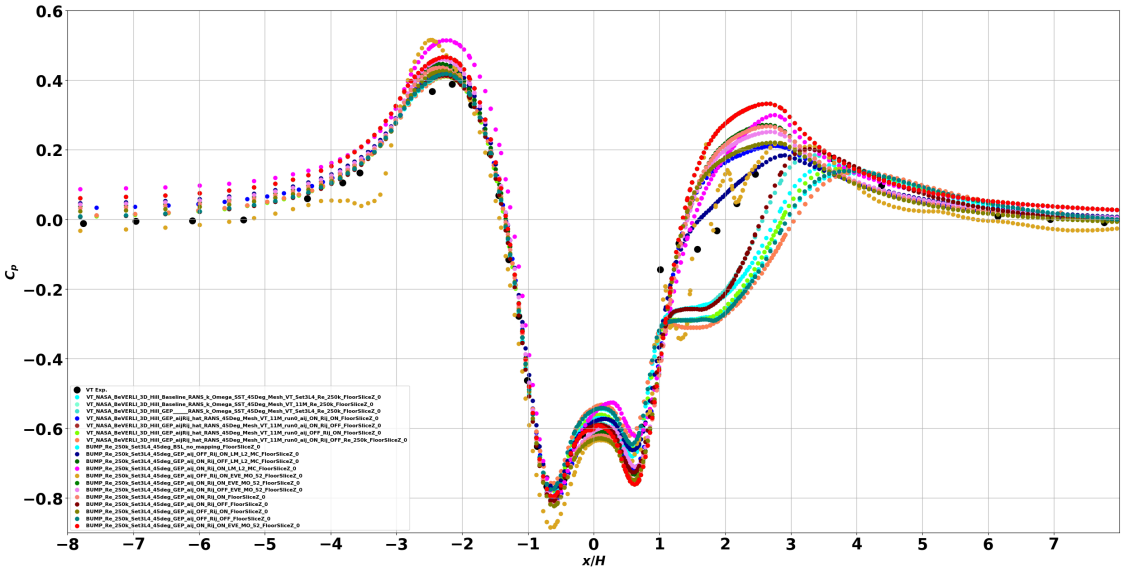
2 Plot C_p along centerline ($z = 0$) plane

[238]:
```
fig = plt.figure(figsize=(30,15))
# 00 Exp. data
plt.scatter(Cp_vs_x_H['x/H'],
 ↪                                                    Cp_vs_x_H['Cp'],
 ↪
 ↪                                    c = 'k',
 ↪label='VT Exp.', s=100)
# 01
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floo
 ↪0'],
 ↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceZ
 ↪(0.5*rhoinf*uinf*uinf),            c=mcolors.CSS4_COLORS['aqua'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
# 02
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSl
 ↪0'],
 ↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSliceZ_0[
 ↪(0.5*rhoinf*uinf*uinf),              c=mcolors.CSS4_COLORS['aquamarine'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSli
# 03
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floo
 ↪0'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceZ
 ↪(0.5*rhoinf*uinf*uinf),            c=mcolors.CSS4_COLORS['turquoise'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
# 04
```

```
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Fl
 ↪0'],          ␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_FloorSlic
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['blue'],       ␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Flo
# 05
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_F
 ↪0'],          ␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_FloorSli
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['brown'],      ␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Fl
# 06
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_F
 ↪0'],          ␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_FloorSli
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['chartreuse'],␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_Fl
# 07
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_R
 ↪0'],␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k_
 ↪(0.5*rhoinf*uinf*uinf), c=mcolors.CSS4_COLORS['coral'],      ␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re
# 08
plt.scatter(BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0['Points:0'],␣
 ↪                                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                ␣
 ↪c=mcolors.CSS4_COLORS['cyan'],       ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0')
# 09
plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceZ_0['Points:
 ↪0'],                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['darkblue'],  ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceZ_0')
# 10
```

```
plt.
  ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceZ_0['Points:
  ↪0'],                                                    ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceZ_0['p']-pref)/
  ↪(0.5*rhoinf*uinf*uinf),                                                c=mcolors.
  ↪CSS4_COLORS['darkgreen'], ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceZ_0')
# 11
plt.
  ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceZ_0['Points:
  ↪0'],                                                    ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceZ_0['p']-pref)/
  ↪(0.5*rhoinf*uinf*uinf),                                                 c=mcolors.
  ↪CSS4_COLORS['fuchsia'],    ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceZ_0')
# 12
plt.
  ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceZ_0['Points:
  ↪0'],                                                    ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceZ_0['p']-pref)/
  ↪(0.5*rhoinf*uinf*uinf),                                                c=mcolors.
  ↪CSS4_COLORS['goldenrod'], ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceZ_0')
# 13
plt.
  ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['Points:
  ↪0'],                                                    ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['p']-pref)/
  ↪(0.5*rhoinf*uinf*uinf),                                                c=mcolors.
  ↪CSS4_COLORS['green'],     ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0')
# 14
plt.
  ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceZ_0['Points:
  ↪0'],                                                    ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceZ_0['p']-pref)/
  ↪(0.5*rhoinf*uinf*uinf),                                                c=mcolors.
  ↪CSS4_COLORS['violet'],    ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceZ_0')
# 15
plt.scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceZ_0['Points:
  ↪0'],                                                          ␣
  ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceZ_0['p']-pref)/(0.
  ↪5*rhoinf*uinf*uinf),                                                      c=mcolors.
  ↪CSS4_COLORS['salmon'],    ␣
  ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceZ_0')
```

```
# 16
plt.scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceZ_0['Points:
 ↪0'],                                                          ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                  c=mcolors.
 ↪CSS4_COLORS['maroon'],    ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceZ_0')
# 17
plt.scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceZ_0['Points:
 ↪0'],                                                          ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                  c=mcolors.
 ↪CSS4_COLORS['olive'],     ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceZ_0')
# 18
plt.scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceZ_0['Points:
 ↪0'],                                                          ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                 c=mcolors.
 ↪CSS4_COLORS['teal'],      ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceZ_0')
# 19
plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['Points:
 ↪0'],                                                  ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                            c=mcolors.
 ↪CSS4_COLORS['red'],       ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0')
#
plt.xlabel('$x/H$', fontsize=20)
plt.ylabel('$C_p$', fontsize=20)
plt.xlim([-8, 8])
plt.ylim([-0.9, 0.6])
plt.xticks(np.arange(-8, 8, step=1.0))
plt.grid()
plt.legend(fontsize=8)
plt.savefig('BH_Cp_Z.pdf')
plt.show()
plt.close()
```

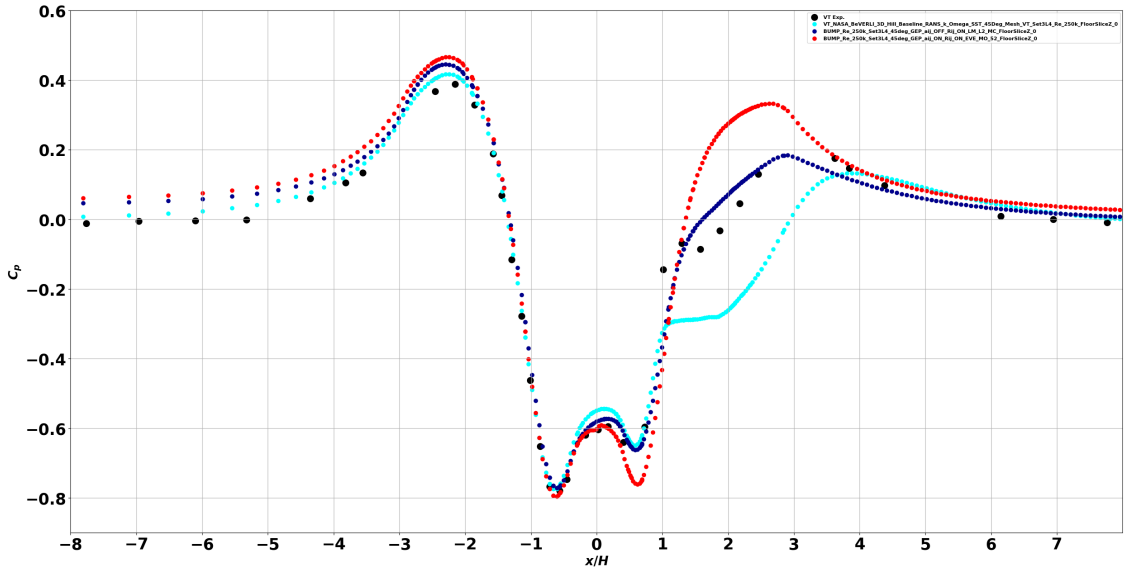


[241]:
```
fig = plt.figure(figsize=(30,15))
# 00 Exp. data
plt.scatter(Cp_vs_x_H['x/H'],
 ↪                                                    Cp_vs_x_H['Cp'],
 ↪
 ↪                                    c = 'k',
 ↪label='VT Exp.', s=100)
# 01
plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floo
 ↪0'],
 ↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceZ
 ↪(0.5*rhoinf*uinf*uinf),            c=mcolors.CSS4_COLORS['aqua'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
## 02
#plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSl
 ↪0'],
 ↪(VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSliceZ_0[
 ↪(0.5*rhoinf*uinf*uinf),              c=mcolors.CSS4_COLORS['aquamarine'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_Baseline_RANS_k_Omega_SST_45Deg_Mesh_VT_11M_Re_250k_FloorSli
## 03
#plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floo
 ↪0'],
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_FloorSliceZ
 ↪(0.5*rhoinf*uinf*uinf),            c=mcolors.CSS4_COLORS['turquoise'],
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_____RANS_k_Omega_SST_45Deg_Mesh_VT_Set3L4_Re_250k_Floor
```

```
## 04
#plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Fl
 ↪0'],         ␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_FloorSlic
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['blue'],      ␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_ON_Flo
## 05
#plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_F
 ↪0'],         ␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_FloorSli
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['brown'],     ␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Fl
## 06
#plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_F
 ↪0'],         ␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_FloorSli
 ↪(0.5*rhoinf*uinf*uinf),          c=mcolors.CSS4_COLORS['chartreuse'],␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_OFF_Rij_ON_Fl
## 07
#plt.
 ↪scatter(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_R
 ↪0'],␣
 ↪(VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re_250k_
 ↪(0.5*rhoinf*uinf*uinf), c=mcolors.CSS4_COLORS['coral'],      ␣
 ↪label='VT_NASA_BeVERLI_3D_Hill_GEP_aijRij_hat_RANS_45Deg_Mesh_VT_11M_run0_aij_ON_Rij_OFF_Re
## 08
#plt.scatter(BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0['Points:
 ↪0'],                                                          ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                  ␣
 ↪c=mcolors.CSS4_COLORS['cyan'],      ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_BSL_no_mapping_FloorSliceZ_0')
## 09
plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceZ_0['Points:
 ↪0'],                                        ␣
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                              c=mcolors.
 ↪CSS4_COLORS['darkblue'],  ␣
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC_FloorSliceZ_0')
# 10
```

```
#plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['darkgreen'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC_FloorSliceZ_0')
## 11
#plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['fuchsia'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC_FloorSliceZ_0')
## 12
#plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['goldenrod'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52_FloorSliceZ_0')
## 13
#plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['green'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0')
## 14
#plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                    c=mcolors.
 ↪CSS4_COLORS['violet'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52_FloorSliceZ_0')
## 15
#plt.scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                c=mcolors.
 ↪CSS4_COLORS['salmon'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_FloorSliceZ_0')
```

```
## 16
#plt.scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                c=mcolors.
 ↪CSS4_COLORS['maroon'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_FloorSliceZ_0')
## 17
#plt.scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                c=mcolors.
 ↪CSS4_COLORS['olive'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_FloorSliceZ_0')
## 18
#plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf),                                                c=mcolors.
 ↪CSS4_COLORS['teal'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF_FloorSliceZ_0')
# 19
plt.
 ↪scatter(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['Points:
 ↪0'],
 ↪(BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf),                                             c=mcolors.
 ↪CSS4_COLORS['red'],
 ↪label='BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52_FloorSliceZ_0')
#
plt.xlabel('$x/H$', fontsize=20)
plt.ylabel('$C_p$', fontsize=20)
plt.xlim([-8, 8])
plt.ylim([-0.9, 0.6])
plt.xticks(np.arange(-8, 8, step=1.0))
plt.grid()
plt.legend(fontsize=8)
plt.savefig('BH_Cp_Z.pdf')
plt.show()
plt.close()
```



[244]:
```
#fig = plt.figure(figsize=(30,15))
##
#plt.scatter(Cp_vs_x_H['x/H'], Cp_vs_x_H['Cp'], s = 100, c = 'k', label = 'VT␣
 ↪Exp.')
##
#plt.scatter(df_BSL_11M_FloorSliceZ_0['Points:0'],␣
 ↪(df_BSL_11M_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf), c='red',␣
 ↪label='kOmegaSST-BSL') #BSL_11M
##
##plt.scatter(df_BSL_Set3L4_FloorSliceZ_0['Points:0'],␣
 ↪(df_BSL_Set3L4_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf), c='green',␣
 ↪label='BSL_Set3L4')
##
##plt.scatter(df_GEP_Set3L4_FloorSliceZ_0['Points:0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf), c='red',␣
 ↪label='GEP_Set3L4')
##
##plt.scatter(df_GEP_aij_ON_Rij_ON_11M_FloorSliceZ_0['Points:0'],␣
 ↪(df_GEP_aij_ON_Rij_ON_11M_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf),␣
 ↪c='blue', label='GEP_aij_ON_Rij_ON_11M')
##
##plt.scatter(df_GEP_aij_ON_Rij_OFF_11M_FloorSliceZ_0['Points:0'],␣
 ↪(df_GEP_aij_ON_Rij_OFF_11M_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf),␣
 ↪c='orange', label='GEP_aij_ON_Rij_OFF_11M')
##
##plt.scatter(df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceZ_0['Points:0'],␣
 ↪(df_GEP_aij_ON_Rij_OFF_11M_run0_FloorSliceZ_0['p']-pref)/(0.
 ↪5*rhoinf*uinf*uinf), c='pink', label='GEP_aij_ON_Rij_OFF_11M_run0')
```

```
##
##plt.scatter(df_GEP_aij_OFF_Rij_ON_11M_FloorSliceZ_0['Points:0'],␣
 ↪(df_GEP_aij_OFF_Rij_ON_11M_FloorSliceZ_0['p']-pref)/(0.5*rhoinf*uinf*uinf),␣
 ↪c='yellow', label='GEP_aij_OFF_Rij_ON_11M')
#plt.
 ↪scatter(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC['
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_LM_L2_MC['p']-pre
 ↪(0.5*rhoinf*uinf*uinf), c='blue',␣
 ↪label='kOmegaSST-GEP_aij_OFF_Rij_ON_LM_L2_MC')
##plt.
 ↪scatter(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC['
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_LM_L2_MC['p']-pre
 ↪(0.5*rhoinf*uinf*uinf), c='blue', label='GEP_aij_ON_Rij_OFF_LM_L2_MC')
##plt.
 ↪scatter(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC['P
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_LM_L2_MC['p']-pref
 ↪(0.5*rhoinf*uinf*uinf), c='green', label='GEP_aij_ON_Rij_ON_LM_L2_MC')
##
##plt.
 ↪scatter(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52[
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON_EVE_MO_52['p']-pr
 ↪(0.5*rhoinf*uinf*uinf), c='yellow', label='GEP_aij_OFF_Rij_ON_EVE_MO_52')
##plt.
 ↪scatter(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52['
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON_EVE_MO_52['p']-pre
 ↪(0.5*rhoinf*uinf*uinf), c='violet', label='GEP_aij_ON_Rij_ON_EVE_MO_52')
##plt.
 ↪scatter(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52[
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF_EVE_MO_52['p']-pr
 ↪(0.5*rhoinf*uinf*uinf), c='orange', label='GEP_aij_ON_Rij_OFF_EVE_MO_52')
##
##plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON['Points:
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_ON['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='black', label='GEP_aij_ON_Rij_ON', marker='|')
```

```
##plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF['Points:
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_ON_Rij_OFF['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='red', label='GEP_aij_ON_Rij_OFF', marker='|')
##plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF['Points:
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_OFF['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='green', label='GEP_aij_OFF_Rij_OFF', marker='|')
##plt.
 ↪plot(-df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON['Points:
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_aij_OFF_Rij_ON['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='blue', label='GEP_aij_OFF_Rij_ON', marker='|')
##
#plt.
 ↪scatter(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_blend_PH_SC['Points:
 ↪0'],␣
 ↪(df_GEP_Set3L4_FloorSliceZ_0_BUMP_Re_250k_Set3L4_45deg_GEP_blend_PH_SC['p']-pref)/
 ↪(0.5*rhoinf*uinf*uinf), c='green', label='kOmegaSST-GEP_blend_PH_WMSC')
##
#plt.xlabel('$x/H$', fontsize=20)
#plt.ylabel('$C_p$', fontsize=20)
#plt.xlim([-8, 8])
#plt.ylim([-0.9, 0.6])
#plt.xticks(np.arange(-8, 8, step=1.0))  # Set label locations.
#plt.grid()
#plt.legend(fontsize=20)
#plt.savefig('BH_Cp_Z.pdf')
#plt.show()
#plt.close()
```

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