

```
1 # VTOL Parameter File
2 import sys
3 sys.path.append('.') # add parent directory
4 import VTOLParam as P
5 from control import tf, bode
6 import matplotlib.pyplot as plt
7
8 # Compute open-loop transfer functions
9 P_lon = tf(1/(P.mc+2*P.mr), [1, 0, 0])
10 P_lat_in = tf(1/(P.Jc+2*P.mr*P.d**2), [1, 0, 0])
11 P_lat_out = tf(-P.Fe/(P.mc+2*P.mr), [1, P.mu/(P.mc+2*P.mr), 0])
12
13 # Plot the closed loop and open loop bode plots for the inner loop
14 fig1 = plt.figure()
15 bode(P_lon, dB=False)
16 fig1.axes[0].set_title('$P(s)$ for longitudinal dynamics')
17
18 fig2 = plt.figure()
19 bode(P_lat_in, dB=False)
20 fig2.axes[0].set_title('$P_{in}(s)$ for lateral dynamics')
21
22 fig3 = plt.figure()
23 bode(P_lat_out, dB=False)
24 fig3.axes[0].set_title('$P_{out}(s)$ for lateral dynamics')
25
26 print('Close window to end program')
27 plt.show()
28
```