PLL Transient response - Leonardo Vazquez

February 23, 2022

1 PLL Transient response

```python
[1]: import matplotlib.pyplot as plt
     import matplotlib as mpl
     import numpy as np
     from scipy import signal
```

```python
[2]: # Constants
     RC = 2.2*10**(-5)
     KC = 3.2
     KO = 4775
     K = 1/KO


     wn2 = RC*KC*KO
     e_1 = 0.7
     e_2 = 0.1
```

```python
[3]: # The system
     sys1 = signal.lti([K], [RC/(KC*KO), 1/(KC*KO), 1])
     sys2 = signal.lti([K], [wn2, e_1 * 2 / wn2 ** 0.5, 1])
     sys3 = signal.lti([K], [wn2, e_2 * 2 / wn2 ** 0.5, 1])
```

```python
[4]: # Transient response
     t, y1 = signal.step2(sys1)
     t, y2 = signal.step2(sys2)
     t, y3 = signal.step2(sys3)
```

```python
[5]: plt.plot(t, (110*10**3)*y1, color="blue", linewidth=2, linestyle="-", label="e␣
     ↪= 0.89")
     plt.plot(t, (110*10**3)*y2, color="red",  linewidth=2, linestyle="-",␣
     ↪label="e=0.7")
     plt.plot(t, (110*10**3)*y3, color="green",  linewidth=2, linestyle="-",␣
     ↪label="e=0.1")

     plt.legend(loc='upper right')
     plt.xlabel('Time  t(s)')
     plt.ylabel('Out Vd(V)')
```

`Text(0, 0.5, 'Out Vd(V)')`