Vibration_T_Nov5

Zhuorui YUN

November 5, 2025

1 Nov 5 Vibration T

Consider once again problem 2.20 that were done in the Nov 1 tutorial. A counter-clockwise moment $M(t) = 20 \sin 12t$ kNm is applied to the beam, as shown in the hand-drawn figure below.

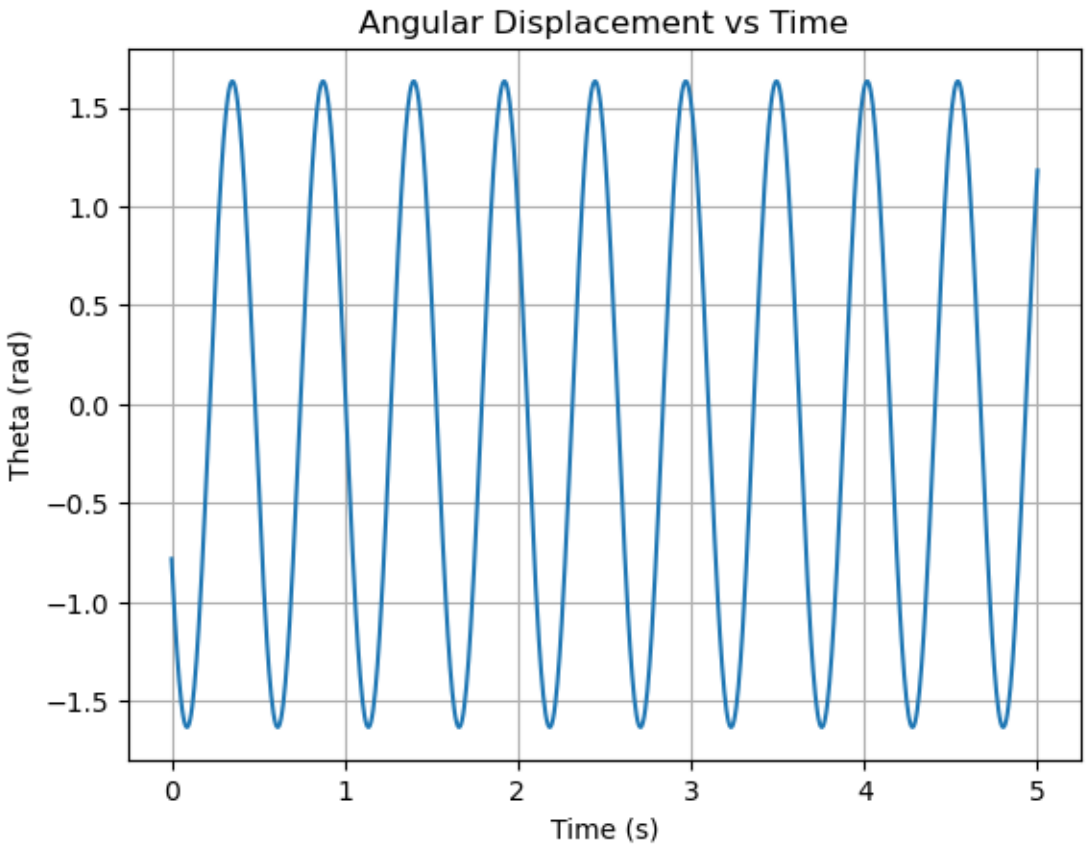
[1]:
```
import numpy as np
from numpy import arctan2, exp, sin, cos, cosh, sinh
import matplotlib.pyplot as plt
from matplotlib.pyplot import figure
```

[ ]:
```
m = 1750
c = 3500
k = 7.0e5
a = 1.25
b = 2.50
```

[12]:
```
omega_n = np.sqrt(k*a*a/m/b/b)
zeta = c/m/2/omega_n
omega = 12.0
t = np.linspace(0, 5, 800)
F = - 10E3* 1j * exp(1j*omega*t)
r = omega/omega_n
G = 1/(1 - r*r + 2j*zeta*r)
Theta = G*F/k
theta = Theta.real
```

[13]:
```
from numpy import rad2deg
from regex import T


plt.plot(t, rad2deg(theta))
plt.xlabel('Time (s)')
plt.ylabel('Theta (rad)')
plt.title('Angular Displacement vs Time')
plt.grid()
plt.show()
```


Angular Displacement vs Time
Theta (rad)
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0
1
2
3
4
5
Time (s)

[ ]: