

pendulum_euler

January 15, 2025

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[1]: %matplotlib notebook
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[1]: import matplotlib.pyplot as plt
import math as m
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[2]: #simulation parameters

omega=1.0
ht=0.01
Nt=5000

#initial conditions
tstep=0
time=tstep*ht
theta=0.25*m.pi
nu=0.0 #inital angular velocity
```

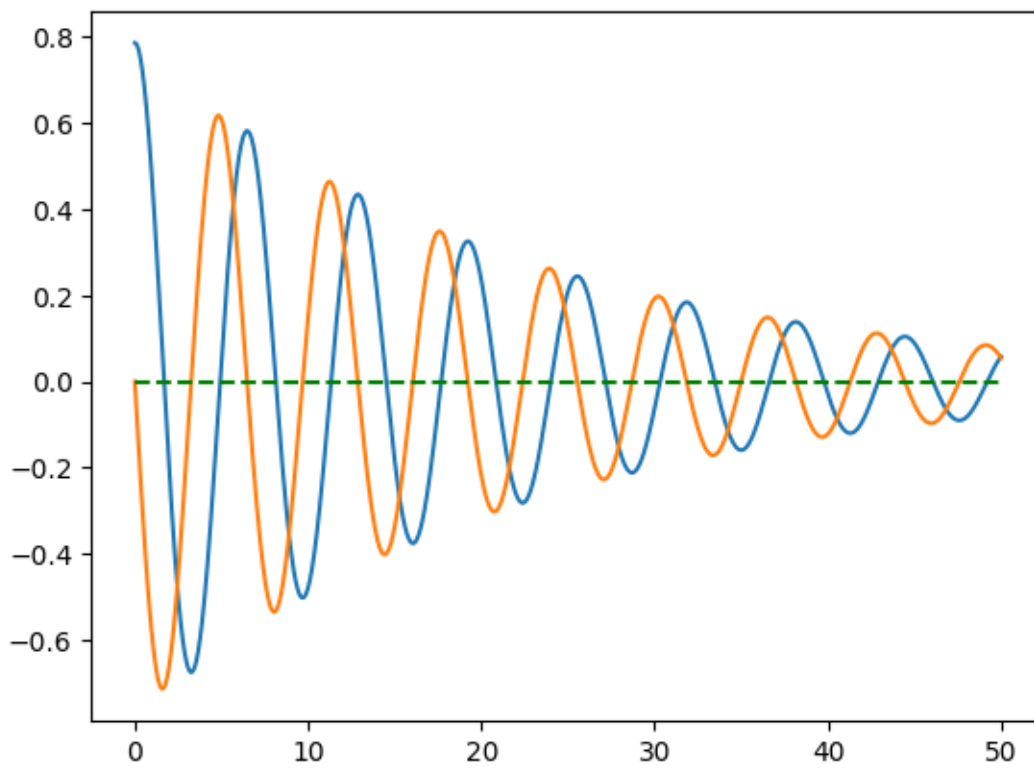
```
[3]: #storage - fill with initial condition
tarray=[time]
thetaarray=[theta]
nuarray=[nu]
```

```
[4]: #main loop
while tstep<Nt:
    thetanew=theta+ht*nu
    nunew=nu-ht*(omega*omega*m.sin(theta)+0.1*nu+0.0*m.sin(0.5*time))
    tstep=tstep+1
    time=ht*tstep
    nu=nunew
    theta=thetanew

    tarray.append(time)
    thetaarray.append(theta)
    nuarray.append(nu)
```

```
[5]: plt.plot(tarray, thetaarray)
plt.plot(tarray, nuarray)
plt.plot([0,Nt*ht],[0,0], 'g--')
```

```
plt.show()
```



```
[ ]: plt.plot(thetaarray,nuarray)  
plt.show()
```