```python
'''
This is the code for the Yo-Yo
Simulated Model written by
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based on the work of Koichi Hashimoto and Toshiro Noritsugu
of Okayama University.
'''

import numpy as np
import scipy as sp
import matplotlib.pyplot as plt

m = 1 # mass of the Yo-Yo
r = 0.1 # radius of the Yo-Yo
l = 1 # lenght of the complete string
e_friction = 0.15 # approx coefficent of friction between common plastics and cotton strings
I = 0.5*m*(r**2) # inertia fo the Yo-Yo
g = 9.801 # gravitational acceleration

dt = np.pi/100 # Time Interval
time_axis = np.arange(0,10,0.1)
theta = np.arange(0,np.pi,dt) # Input of Various Angular Positions
theta_d1 = np.gradient(np.sin(theta),dt) # Velocity profile for a sinusoidal input rotation
theta_d2 = np.gradient(theta_d1,dt) # corresponding angular acceleration

def linear_acceleration(theta_d1_val, theta_d2_val):
    '''
    This function is used to calculate the instantaneous
    linear acceleration of the Yo-Yo given the angular
    acceleration and angular velocity of the Yo-Yo based on
    the analysis given in the document.
    '''
    return (((I+m*(r**2))*theta_d2_val + r*e_friction*theta_d1_val)/(m*r)) - g

h_d2 = [-linear_acceleration(theta_d1[i],theta_d2[i]) for i in range(len(theta_d1))]
h_d1 = [0]
h = [0]

# Calculation of Integral to find Height of the Yo-Yo
for a in h_d2:
    h_d1.append(h_d2[-1] + a*dt)
    h.append(100*(h_d1[-1] + 0.5*a*dt**2) % 1000)

fig, axs = plt.subplots(2, 2)
axs[0, 0].plot(time_axis, theta)
axs[0, 0].set_title('Input Angles or Value of Rotation')
axs[0, 1].plot(time_axis, theta_d1, 'tab:orange')
axs[0, 1].set_title('Angular Velocity or the first derivative of Î¸')
axs[1, 0].plot(time_axis, theta_d2, 'tab:green')
axs[1, 0].set_title('Angular Acceleration or the second derivative of Î¸')
axs[1, 1].plot(time_axis, h[1:], 'tab:red')
axs[1, 1].set_title('Value height of the Yo-Yo in cm')

fig.tight_layout()

for ax in axs.flat:
    ax.set(xlabel='time in seconds')

plt.legend(loc="best")
plt.show()
```