Assignment 2

Changrui Cai

***Abstract*— This document is assignment 2 of MAE263F class.**

I. Problem 1 result

In this question, our setting is density ρ = 1000 kg/m^3, cross- sectional radius r0 = 1 mm, Young's modulus E = 10 MPa, shear modulus G = E/3, and gravitational acceleration g = [0, 0, −9.81]^T . Moreover, one of the ends is fixed.

The initial state of the system is provided in the graph below:

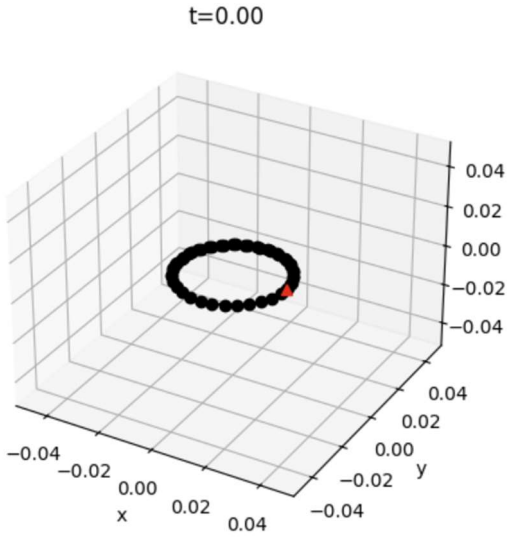

Fig. 1: Initial state of elastic rod

After 5 seconds, the final state is listed below:

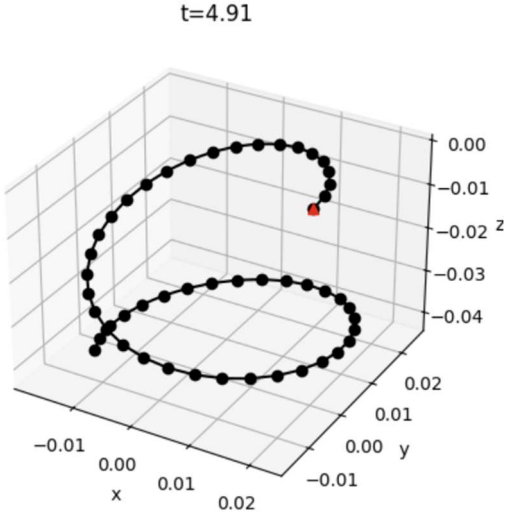

Fig. 2: Final state of elastic rod

The recorded z coordinate vs. time is provide in the figure below:

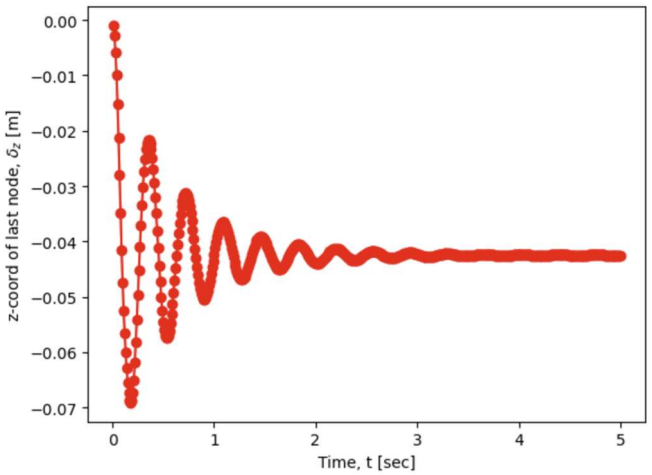

Fig. 3: Z-coordinate vs. time

II. Discussion

The initial shape of the elastic rod is circular. When the simulation begins, one end of the rod starts to fall. The displacement is initially significant, reaching approximately -0.07 m, and eventually stabilizes at -0.04 m in the final state.

References

[1] M. K. Jawed and S. Lim, *Discrete Simulation of Slender Structures*. 2022.