Homework1_Ren

Zhicheng Ren

***Abstract*— Homework1.**

I. IMPLICIT

Figure 1. Structure Configuration at Time t = 0s

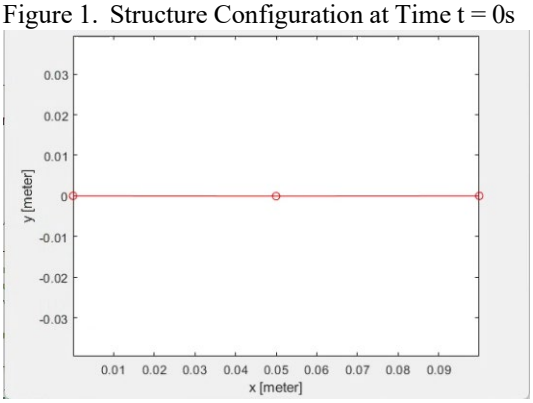


Figure 2. Structure Configuration at Time t = 0.01s

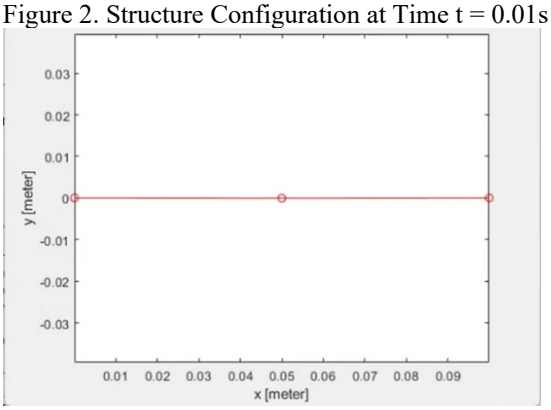


Figure 3. Structure Configuration at Time t = 0.05s

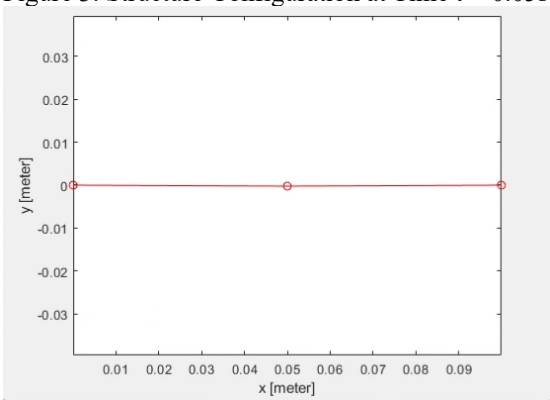


Figure 4. Structure Configuration at Time t = 0.1s

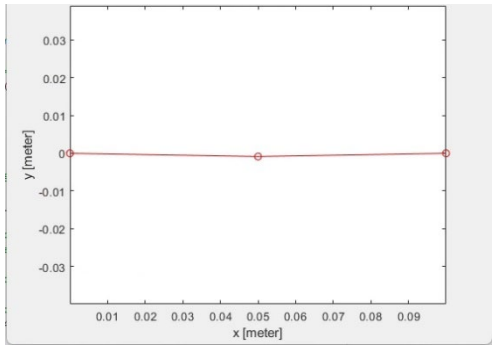


Figure 5. Structure Configuration at Time t = 1s

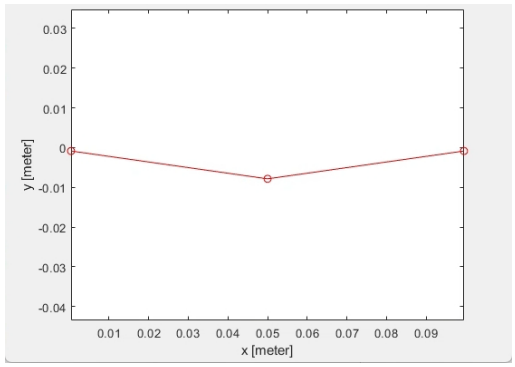


Figure 6 Structure Configuration at Time t = 10

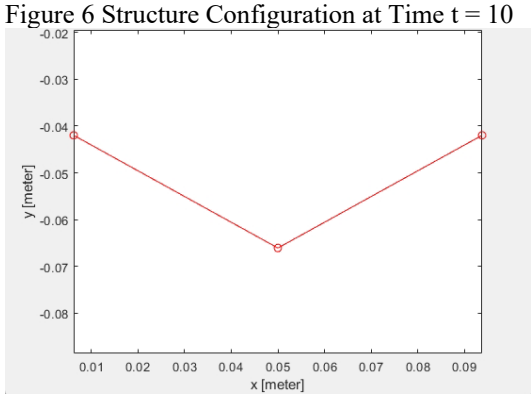
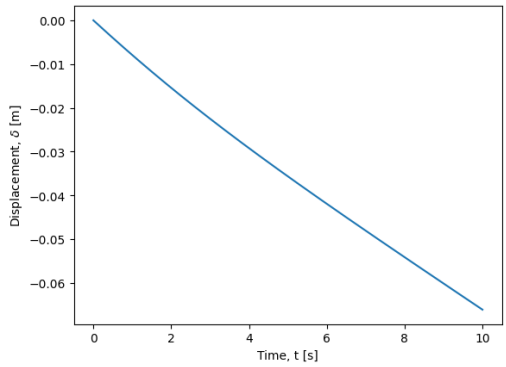


Figure 7 Position VS Time



II. EXPLICIT

Figure 8 Structure Configuration at Time t = 0s

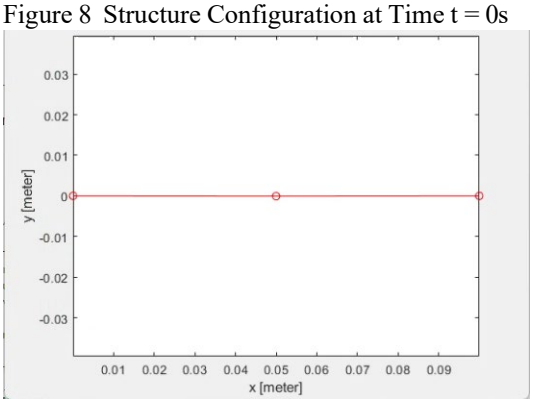


Figure 9 Structure Configuration at Time t = 0.01s

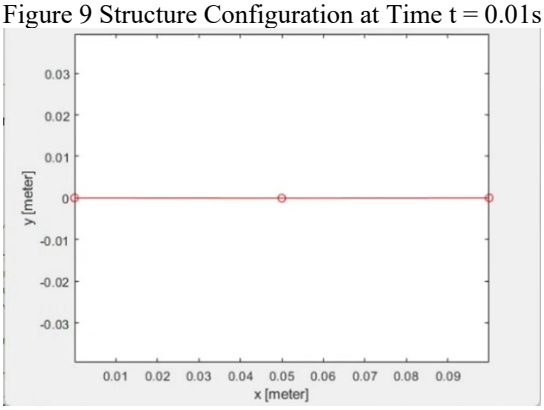


Figure 10.tructure Configuration at Time t = 0.05s

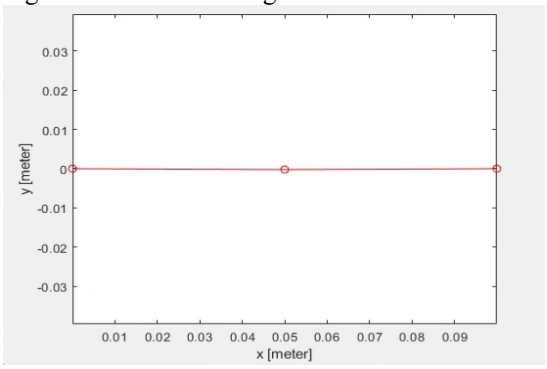


Figure 11Structure Configuration at Time t = 0.1s

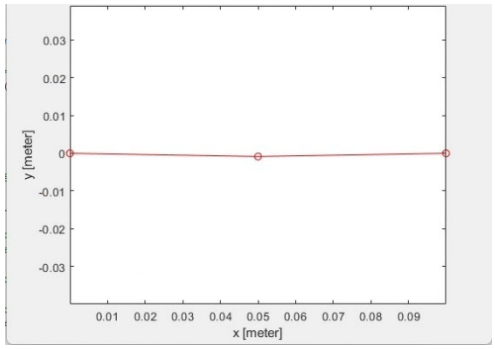


Figure12strre Configuration at Time t = 1s

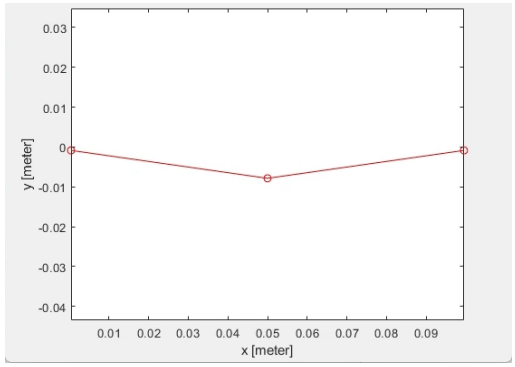


Figure 13.ucture Configuration at Time t = 10

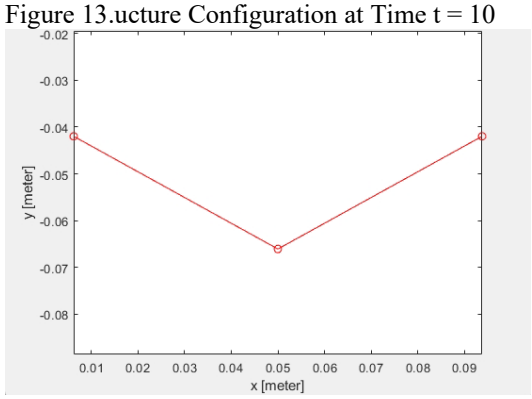


Figure 14 Position VS Time

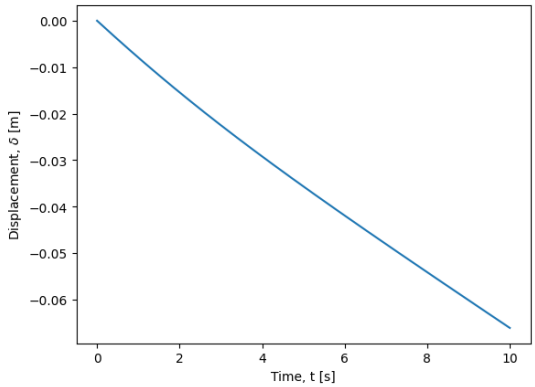
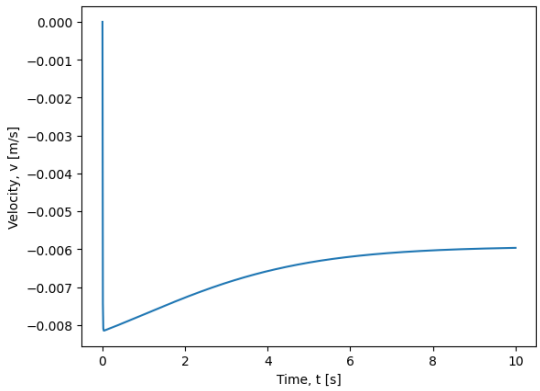


Figure 15 Velocity Vs Time



B.e terminal velocity (along y-axis) of this system is
Implicit Terminal V= 0.00612625
explicit Terminal V= -0.00613447

D. The explicit and implicit numerical methods are commonly used for solving differential equations in simulations. The explicit method, although computationally simple, can become unstable when using larger time steps, which leads to inaccuracies such as sudden increases in position and velocity or oscillations. This instability requires the use of small time steps to maintain both accuracy and stability in calculations. On the other hand, the implicit method is more computationally complex but remains stable even with larger time steps, making it more suitable for scenarios where computational stability is a priority over speed. Consequently, there is often a trade-off between the simplicity and speed of the explicit method and the stability but higher computational cost of the implicit method.

III. PROBLEM 2

Figure 18. falling beam position over time

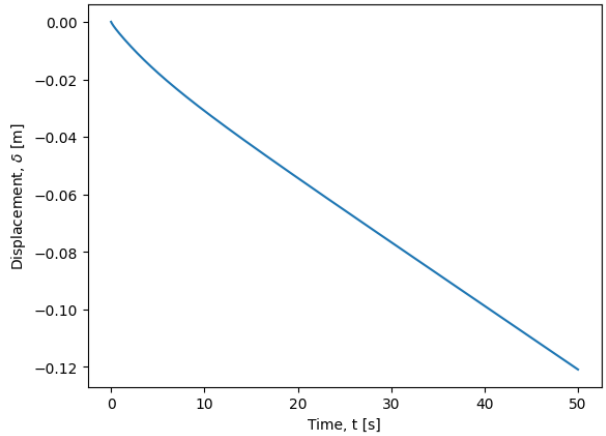


Figure 19. falling beam velocity over time

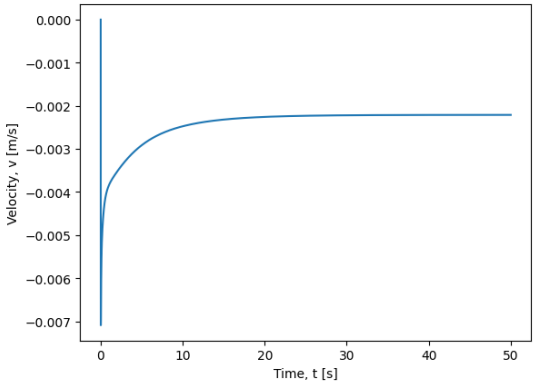


Figure 17. falling beam with same size

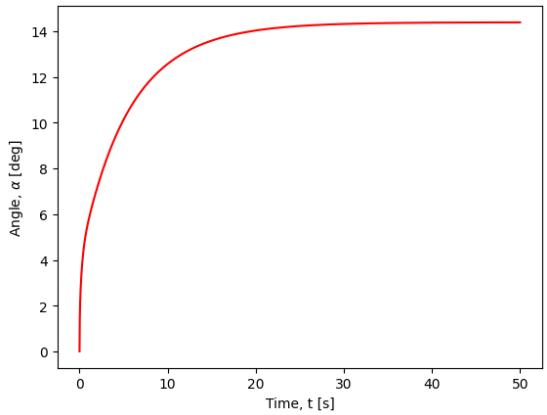
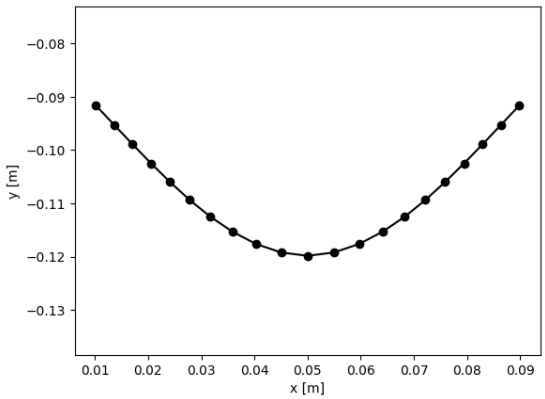


Figure 20. falling beam final shape



The terminal V=-0.00245841