Free Fall Simulation

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***Abstract*—To simulate free-fall experiment at the environment with friction and without friction in Matlab program.**

Keywords—free fall, friction, frictionless, environment, matlab, simulation

I. INTRODUCTION

This homework is about free fall in different environments. There are two objects with a different mass. They are falling to ground in two environments. The first environment is without friction and the second environment has air friction. Objects are falling at different times in environments. The purpose of homework is simulating to these free falls.

II. PHYSICAL FORMULAS

A. *Without Friction*

Environment that without friction only depends on time value for height.

$$h = 1/2 * g * t^2$$

We can calculate time with this formula.

B. *With Friction*

Environment that with friction depends on time, mass and k constant values for height.

$$h(t) = g * (m^2/k^2) * e^{(-k/m)*t} + g * (m/k) * t - g(m^2/k^2)$$

We can calculate time with this formula. It calculate height values with limit speed

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III. CODE EXPLANATION

I will explain my code with line numbers.

0-5 are for constant values

7-9 are to take input from user

11-12 are to pin figure(to not close)

14-21 are to calculate time for without friction and with friction m1 and m2 mass

24-45 are to calculate height values for each mass at all unit time and create arrays with this values.

49-81 are to draw movements of each mass depends on to time

RESULTS

There is disappearance problem for my code but i am drawing multiple objects at the same time with same plot function and i couldn't find a way to solve this problem. I used formulas from lecture book and i used same k constant for two objects. It causes wrong time according to real life time. There is physical lack of knowledge.

REFERENCES

[1] Fikri Öztürk Matematiksel Modelleme ve Simülasyon Pages-14,15