Theoretical Mechanics Big Homework

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1 MEME

Me when I take TheorMech final and homeworks:

2 LINKS

Link to colab

3 Task

3.1 Description

We have cart-pole system. Calculate it. And prove that it is calculated correctly initial conditions:

- $x = 0,\ \phi = 15°,\ \dot{x} = 0,\ \dot{\phi} = 0,\ t = 0$;
- $x = 0.25\ m,\ \phi = 45°,\ \dot{x} = 0,\ \dot{\phi} = 0,\ t = 0$;
- $x = 0.25\ m,\ \phi = -135°,\ \dot{x} = 0,\ \dot{\phi} = 0,\ t = 0$;

3.2 Measurements

By using scales, Elina measured, that cart itself weights 266g, pendulum weights 154g, a rod weights 20g (which is, considered everything, small enough to be neglicable), and using tape measure she measured the length of the rod, which happened to be 38cm.

Then, Timur provided necessary equipment (Arduino IDE, Arduino code, laptop, and an Exel table) to gather the actual movement of the system. I was responsible for taking the measurements. Results can be seen in Exel file in my github.

Rizo parsed all of these files and plotted $x, \dot{x}, \phi, \dot{\phi}$ of the system.

3.3 Uh Oh...

Well, it is 4:36 am now. I can't really go on. We really did what we can. The thing is - I don't have the correct mathematical model code, neither patience and energy to derive it. Though I did something in the code, that is remotely looking like something real, but far from the experiment yet.