Physics Investigation 3 Task Sheet

Observation

On release after being pulled down, a spring oscillates with decreasing amplitude due to air damping, and finally becomes stationary.

Problem

Will the damping effect be different in different media? If so, how does it vary in different media?

Hypothesis

Aim

Principle

For a damped oscillation, energy is lost to overcome the resisting forces i.e. damping forces, such as air resistance, viscosity and friction. In different media, the strength of resisting forces varies, so does the extent of damping.

Equipment and materials

- Desktop computer × 1
- Datalogging interface × 1
- Position sensormeter × 1
- Springs × 2
- 50 gram mass set × 1
- Retort stand × 1
- Clamps × 2
- Beakers × 2
- Glycerine oil

Set-up

Photograph showing set-up of oscillating spring, position sensormeter and datalogger

Procedure

1. Hang a spring from a clamp on the stand and attach to its lower end the arm of a position sensormeter;
2. Attach another spring to the arm of the position sensormeter. A mass set is hung from its lower end;
3. Hang both springs from the farthest hole of the arm of the position sensormeter;
4. Clamp the probe of the position sensormeter. Adjust its position so that its arm is horizontal and the springs are vertical;
5. Extend the spring by pulling the mass set downwards until the arm does not move anymore, then release it;
6. Record the movement of the system on the computer;
7. Plot a graph of amplitude of oscillation against time;
8. Repeat steps 5 to 7 with the mass set completely immersed in a beaker of water and a beaker of oil;
9. Compare the three graphs obtained.

Precautions

1. As the maximum range of the angle of the position sensormeter is 0° - 30°, the amplitude of oscillation should be kept small;
2. Make sure that the mass set is oscillating totally within the water and the oil.

Results

Interpretation

Possible errors

Improvement

Conclusion