

Physics 120 Lab 4: Flying Pigs

Gather your equipment: one plastic pig with wings, a length of string, and a magnetic hook.

Use the hook's magnet to stick it to the ceiling; tie one end of the string through the loop on the pig's back and place the loop at the other end over the hook. Open the pig's wings (so that it clicks into place) and turn on the switch on the pig's side, and watch it fly!

Note the pig's motion. What kind of motion is this?

What parameters of this motion are measurable?

What parameters must be calculated from the measurable?

Using the available equipment, obtain values for the following quantities:

- period of the motion,
- frequency and angular frequency of the motion,
- velocity of the pig,
- acceleration of the pig,
- tension of the string.

Theoretical Analysis:

Draw a free-body diagram of the pig at a moment during its motion and derive an expression for the net force in terms of the measurable parameters.

Considering the type of motion of the pig, what other expression must the net force equal?

Set the two expressions for net force equal to each other derive an expression for the period of the motion based on the measurable parameters.

What parameters should the period depend on?

Test your theory by inserting your measured values into your expression for period and compare your "theoretical value" of the period to your measured value. If there is a significant disagreement, re-examine your theory. See if you can reconcile the results and your theoretical model. You may also confer with other lab groups and see if their data lead to a calculated period that agrees with their measured value.