Circular Motion

ZHANGYIHENG 10.7 27

Contents

1 Introduction

1.1 Circular Motion

The circular motion refers to the motion of an object that moves along a circular path. In circular motion, an object moves with a constant speed around a fixed point or axis without changing its distance from the center.

1.2 Aim of the Experiment

To find the relationship between t(Time) and v(Linear Velocity) when there exists a angular acceleration(α)

1.3 Apparatuses

1. laptop
2. https://phet.colorado.edu/en/simulations/legacy/rotation

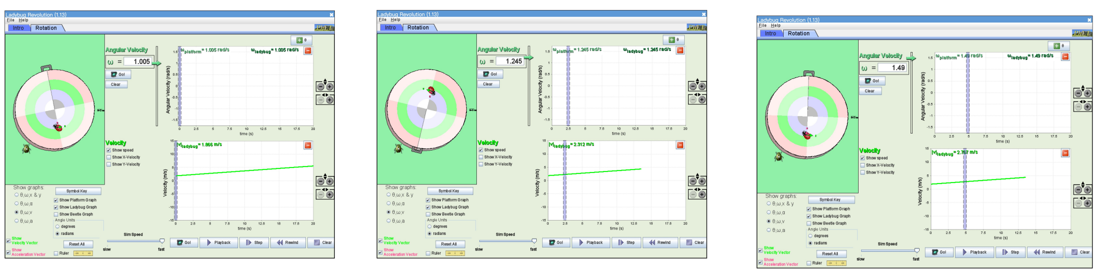
2 Data Collection

2.1 Procedure

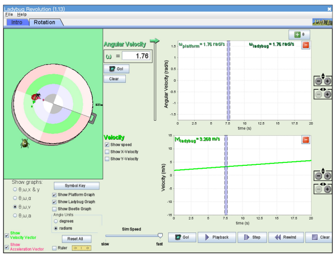
Simulate with the software.

All the data are recorded in the raw data table.

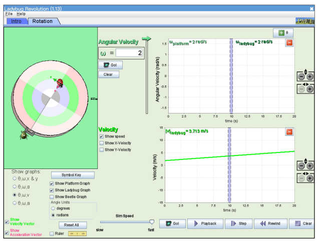
2.2 Screenshots



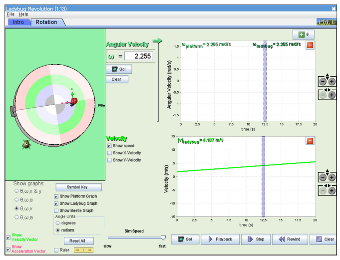
(a) $0s$ (b) $2.50s$ (c) $5.00s$



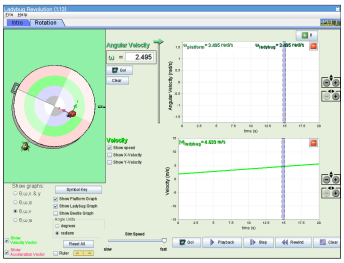
(d) 7.50s



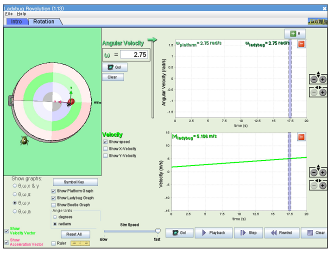
(e) 10.0s



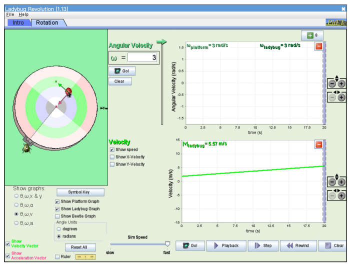
(f) 12.5s



(g) 15.0s



(h) 17.5s



(i) 20.0s

2.3 Raw Data Table

time(s)	$\alpha(ms^{-2})$	$v(ms^{-1})$
0	0.1	1.866
2.50	0.1	2.312
5.00	0.1	2.767
7.50	0.1	3.268
10.0	0.1	3.713
12.5	0.1	4.187
15.0	0.1	4.633
17.5	0.1	5.106
20.0	0.1	5.57

Table 1: Raw Data Table

3 Data Processing

Entering all the data into the data table, I drew a best-fit line with a slope of $0.1860 \pm 0.002ms^{-2}$

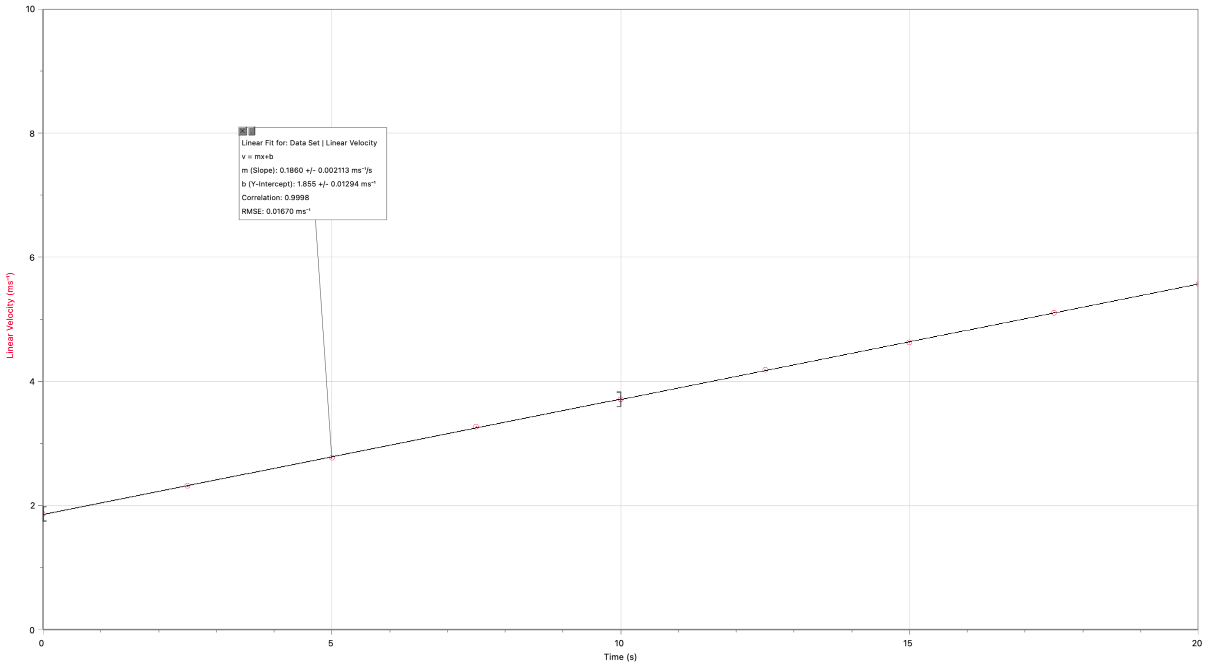


Figure 1: Relation Between t and v

4 Conclusion

When an angular acceleration of 0.1 $rads^{-2}$ is present, the correlation between linear velocity(v) and time(t) is

$$v = 0.186t$$

The Y-intercept of correlation is dismissed because the initial velocity for rotation was set to be $0.100ms^{-2}$.

We can also deduce the numerical value through formulas. Given that $v = r\omega$ and $\alpha = \frac{\Delta\omega}{\Delta t}$, we can know that $a = \frac{\Delta v}{\Delta t} = r\frac{\Delta\omega}{\Delta t}$. The radius of the rotation is about 1.86m, so the linear acceleration is supposed to be $0.186ms^{-2}$.

5 Evaluation

This investigation is on simulation software, thus there's no uncertainty and very precise. hi