

Report

Title

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Introduction:

Aim:

The aim of this experiment is to determine a quantitative measure of the chaos in the motion of a triple pendulum, and use this to determine a relationship between the extent of chaos exhibited by the pendulum, and the the initial potential energy of the pendulum arm.

Hypothesis:

o Make predictions for what you expect to see in the experiment,
i.e., state your hypothesis

Refer to your measurable variables consistent with later analysis
~1-2 sentences of text

Scientific basis for study presented that reflects synthesis of research
Including references to relevant journal papers and your own knowledge of
physics

Include relevant equations and concepts
Insightful context of the experiment and scientific basis
What is the issue or problem your experiment addresses?

0.5 page

Experimental Setup and Method:

Provide a list of equipment, and variables that were measured
Describe your experimental method including calculating uncertainties
Include diagrams where appropriate
The reader should be able to reproduce your method
Bullet points are OK, but use full sentences
1– 2 pages of text and diagram

Data and Results:

Comment on the precision of your measurements. Indicate main sources of error, clearly explain how you estimated/calculated uncertainties.
Present the final form of the analysed data (e.g. final graphs, tables, bar graphs, LINEST results). It should align with your aim.
Include the method you used to analyse the data (e.g. I plotted these two variables against each other, I used Excel to fit this trend, and so on).
Don't forget to include units, uncertainties, and use correct number of significant figures.
Describe your results
Include tables of data and Excel plots where appropriate
Make sure all data has units and appropriate uncertainties
1-2 pages of text and diagrams

Discussion and Interpretation:

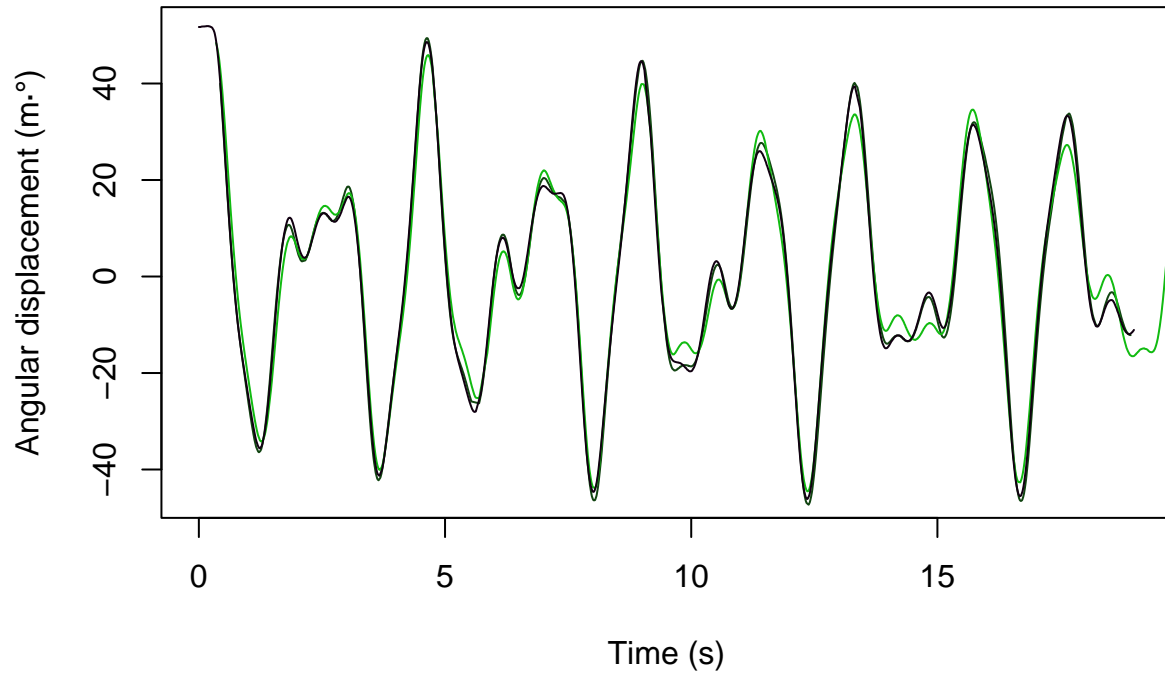
Interpret the analysed data to answer the aim
Comment on the validity, reliability and accuracy of the data
Discuss your uncertainty analysis and sources of error.
If there are discrepancies between predictions and measurements, discuss these and provide plausible explanations/justifications.
Any limitations of your experimental approach?
Connect your results to your experiment aims/hypotheses
~ 1 page of text

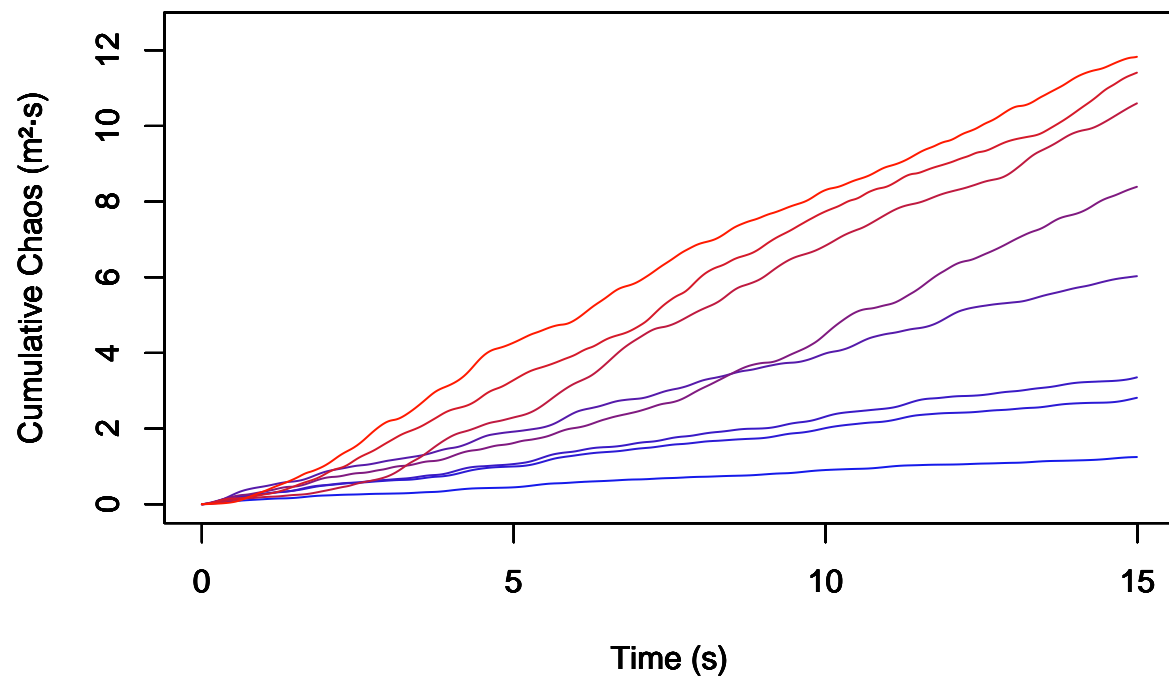
```
## 'data.frame':    148434 obs. of  24 variables:
## $ Recording   : int  223 223 223 223 223 223 223 223 223 223 ...
## $ Time        : num  0 0.00833 0.01667 0.025 0.03333 ...
## $ Type        : chr  "prop" "prop" "prop" "prop" ...
## $ InitAngle   : num  45 45 45 45 45 45 45 45 45 45 ...
## $ AddedMass   : int  0 0 0 0 0 0 0 0 0 0 ...
## $ LateStart   : int  0 0 0 0 0 0 0 0 0 0 ...
## $ BlueX       : num  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
## $ BlueY       : num  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
## $ BlueAngle   : num  -45 -45 -45 -45 -45 ...
## $ BlueDist    : num  1.41 1.41 1.41 1.41 1.41 ...
## $ YellowX     : num  0.0176 0.0174 0.0176 0.0176 0.0174 ...
## $ YellowY     : num  -0.359 -0.358 -0.359 -0.358 -0.358 ...
## $ YellowAngle : num  2.82 2.78 2.82 2.81 2.78 ...
## $ YellowDist  : num  0.359 0.359 0.359 0.359 0.359 ...
## $ PinkX       : num  0.0417 0.0423 0.0412 0.0401 0.0395 ...
## $ PinkY       : num  -0.731 -0.731 -0.731 -0.731 -0.731 ...
## $ PinkAngle   : num  3.26 3.31 3.22 3.14 3.09 ...
## $ PinkDist    : num  0.732 0.733 0.732 0.732 0.732 ...
## $ GreenX      : num  0.338 0.338 0.338 0.337 0.337 ...
```

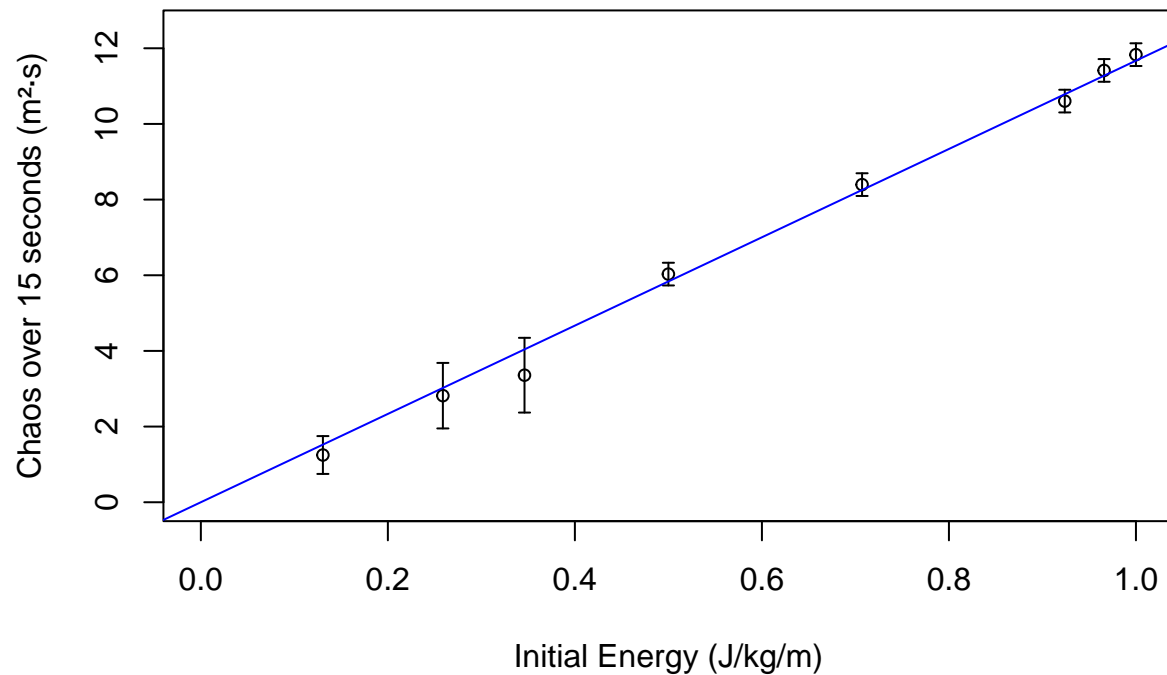
```

## $ GreenY      : num  -0.957 -0.956 -0.955 -0.954 -0.955 ...
## $ GreenAngle  : num   19.4 19.5 19.5 19.5 19.5 ...
## $ GreenDist   : num   1.01 1.01 1.01 1.01 1.01 ...
## $ Timeshifts  : num    0 0 0 0 0 0 0 0 0 ...
## $ AdjTime     : num    0 0.00833 0.01667 0.025 0.03333 ...
## [1] 45.0 90.0 135.0 180.0 15.0 30.0 40.5 60.0 150.0

```







```
##
## Call:
## lm(formula = difSet ~ 0 + energySet)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.68179 -0.22182 -0.02039  0.14636  0.19417
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## energySet  11.6724     0.1655   70.52 3.03e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3201 on 7 degrees of freedom
## Multiple R-squared:  0.9986, Adjusted R-squared:  0.9984
## F-statistic: 4973 on 1 and 7 DF, p-value: 3.031e-11
```

Conclusion:

Address the aim/question based on evidence from your results.
 Any limitations (with uncertainties) and future work
 A few sentences.

References