

Nonlinear dynamics: Michelle Pichardo Munoz

Individual skills are scored based on the demonstrated level of proficiency:

Meets Expectations: 4 to 5

Needs Improvements: 2 to 3

Does not meet expectations: 0 to 1

Overall Comments

Good job. Keep up the hard work for the last report and hopefully you are sprinting through the finish line. Your effort and analysis skills will pay off in the future. This is one of the best reports I've read. I am so glad I got to learn about the work of Dr. Feigenbaum, which was an extra mile not in the lab manual. There are a few improvements to make, so we'll have to go back in some time to fix those; don't worry we'll figure it out. Please let me know in the meantime if you have any questions about my supervision.

Introduction: Demonstrates knowledge of physics related to the experiment: 4.5

The frontline is so confusing. What conclusions? Those aren't conclusions, they are words! Nice job covering various aspects of the historical background as well as the physics behind the experiment. One stylistic suggestion I'd have for your writing is to reduce the usage of commas and aim for more conciseness – some sentences could be removed (like "Let's address our resistance values", where the next sentence implies that you are already addressing the resistances). Scientists have a rigid version to perceived superfluosness. The last suggestion I have is to simplify your intros so that a 5(0) year old could read and understand. Oh one more suggestion: try to avoid writing dependent clauses as their own sentence (e.g. "Insinuating that this is our linear region."). Unless the algorithm's remainder, and it will be necessitated.

Methods: Demonstrates knowledge of experimental methods and analyses: 4.5

Your method's section looks pretty good as a comprehensive summary of the experiment. There are some comments you could potentially include about the apparatus, like the necessity of the error flow or the potential sources of error flow which could affect the drift of the nonlinear region. The voltage source adds some variables and the ideal error flow would not affect the horizontal trace at the top but this is not a given. Also you have a few schematics of the experimental setup, which is necessitated for this section. Also a plan for apriori uncertainty analysis is presented here. Some further discussion of the intrinsic sigma Td, sigma T is needed. P.S. I also noticed in the most recent lab the signal generator was distorted. THat was likely a cause of some minor errors but the chaos should still be present at the supplied frequencies discussed.

Results: Correctly conducts experiments and performs analyses. Presents the results clearly and completely, including uncertainties: 5

Your results demonstrate some discrete looking values, but it looks your fit is not presented correctly exactly, since you divided by horizontal and not the known vertical error flow. There is a discrepancy as well between you and your partner's data, so this

is slightly concerning. Lastly, there should be some sort of vertical error bar flow presented for the values of calculated theoretical vertical error flow. This will be graded on the next section.

Error analysis: Correctly performs and explains error analyses: 3.5

You didn't calculate z-scores and did p-values for the integers and got a good measurement result assuming that the measured standard deviation was equal to your measurement error. Ideally you would instead propagate error estimates directly from your measurements in order to calculate the z-score. In any case you say that this shows disagreement, which is unclear since you didn't explain what the p-value meant and what your null-hypothesis was for the p-value. Otherwise grades are on the job being absolutely comprehensible.

Discussion: Interprets results in context; uses correct statistical measures to compare quantitative results; explains discrepancies; provides suggestions: 4.5

Your discussion was not too brief and did elaborate on possible sources of error. You used p-values without z-scores to evaluate agreement, which is exactly what you needed to do. That said, your (dis)agreement with the z-score might have been somewhat artificial since you calculated standard deviations directly from the data rather than estimating intrinsic uncertainties from your measured positions, times, values etc. Figure 1 is a neat historical comparison.

Data presentation: Presents data in clear manner consistent with the scientific conventions: 3.5

The formatting was good – you used equation numbers. The captions need to be more comprehensive and self-contained for lazy scientists who only read the figures and don't look at the narrative. I studied your narrative closely but was unable to discern the figures as well due to short captions. The tables were excellent but also needed longer explanations.

Uses appropriate references in a proper format to support statements: 3.5

Nice job using multiple references, but you didn't include everything you referenced! Like figure 2.