PHY 4210-01 Senior Lab
Lab C1: Mathematical Models of Chaotic Physical Systems

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Abstract

Chaotic behavior was studied by creating mathematical models and altering key parameters. A simple chaotic model was then observed by measuring time intervals of droplet formation from a leaking faucet. A small change in initial conditions can equate to much larger changes in the behavior of a system.

Contents

1 Period Doubling Region of the Logistic Equation

2 Chaotic Region of the Logistic Equation

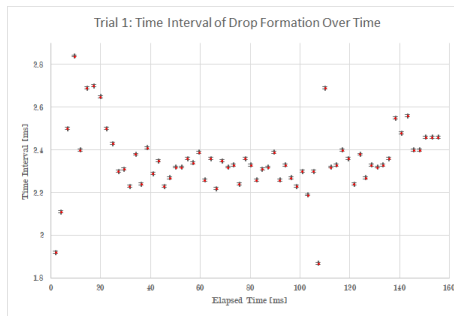# 3 Lyapunov Experiments

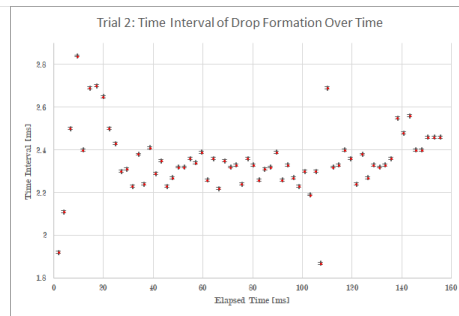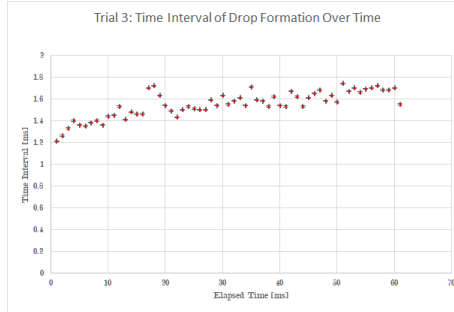## 3.1 Water Drop Experiment
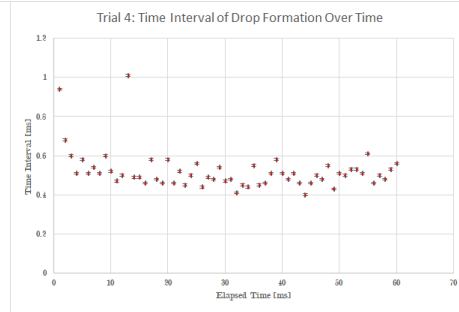

Figure 1: sink1

Figure 2: sink2

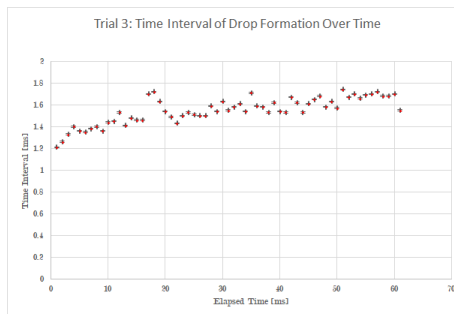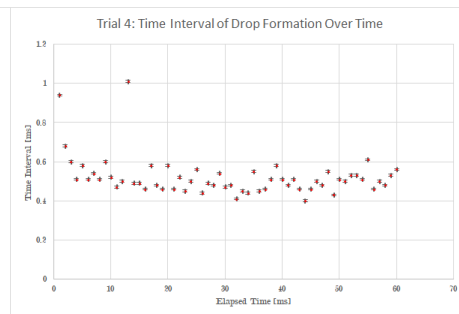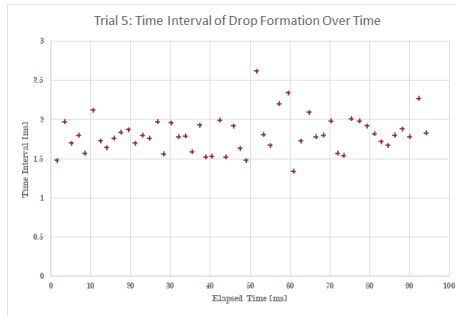Figure 3: sink3

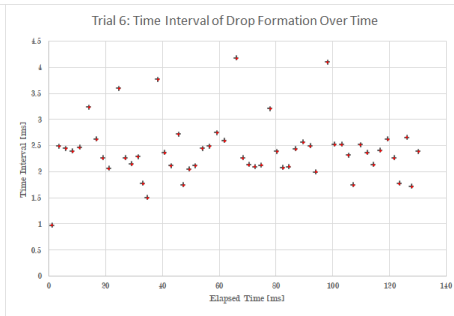Figure 4: sink4

Figure 5: sink3

Figure 6: sink4

Figure 7: sink5

Figure 8: sink6

4 Sources of Error

5 Conclusion

6 Appendices

6.1 Appendix A: Data

6.2 Appendix B: Source Code

6.2.1 Error Propagation and Data Processing