

Undergraduate Thesis Proposal

Under the supervision of Dr. Lorenz, I will study various graphical methods for bifurcation and chaos. While many software packages can be used to help solve dynamical systems, few of them have all of the required tools needed to observe the full behavior of these systems. This research will use various software packages, implementing them together into a new program designed to simplify the visualization of bifurcations in any dimension.

This program will integrate the following packages: Dynamics Solver, ODE Architect, MATLAB, and Maple. This program will combine all the strengths of these packages and use them to create more informative representations of dynamical systems. This research will also involve the Visual Lab in the Science and Mathematics Learning Center. The Visual Lab will be used to demonstrate the elegance and complexity of these kinds of maps. Specifically I will be using the three dimensional projector to show the bifurcations. In conjunction with this I will also be working with Dr. Sulsky in implementing more user friendly software in the lab. The current software in the lab requires considerable experience working with three dimensional projectors. Replacing the software will make the lab more accessible to the research and teaching community.

To demonstrate the effectiveness of this bifurcation software I will attempt to solve the open question, “in forced oscillators is there a relationship between the forcing frequency and the amplitude for the bifurcation in a two dimensional system?”