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Characterization of Non-Linear Pendulums through Frequency Bifurcation VY TRAN, RICHARD ATHERTON, ERIC BROST, JILLIAN SCHLEICHER, ANN ZIEGLER, MARTIN JOHNSTON, JEFF JALKIO, University of St. Thomas - Physics Dept — The bifurcation of a sinusoidally-driven pendulum was studied by sweeping through a range of driving frequencies. At each step, the dynamics were characterized by calculating the periodicity, principle Lyapunov exponent, system parameters, and the fractal dimensionality of the Poincare sections. The system was then modified by placing a magnet under the pendulum which opposed a magnet attached to the end of the pendulum. This dipole-dipole interaction split the original single-well potential into a double-well potential. The bifurcation was repeated for the perturbed wells and the characterization parameters were calculated and compared with the unperturbed system. The results from both pendulums were compared with simulated systems created using an ODE solver.

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