Mechanical Vibrations of Spring Systems

Matthew Burke and Ananth Mohan

March 30, 2014

1 Abstract

The goal of this project is to demonstrate the mathematical and visual properties of mechanical vibrations. These vibrations are visualized through a mass-spring system, where a hanging solid has its position, velocity and acceleration determined by a set of environmental variables. Mechanical vibrations are described with a set of differential equations: when solved, we can find the position equation $y(t)$, which depends upon time. This solution was used to graph the position of an object using JavaScript in a web browser application, where the use can set the environmental variables.
In this project, we explored four types of equations, each one including more environmental factors:

1. Undamped Free Vibration
2. Damped Free Vibration
3. Undamped Forced Vibration
4. Damped Forced Vibration

2