

## Introduction

We will continue our study of the “mass-spring-dashpot” system, governed by the differential equation

$$mx'' + bx' + kx = F_{ext}(t).$$

Remember that  $m$  represents the mass of the dashpot,  $k$  the strength of the spring, and  $b$  the damping.  $F_{ext}(t)$  represents some external driving force.

We’ve already seen how to solve this equation if there is no driving force, i.e., if we have

$$mx'' + bx' + kx = 0.$$

We will now discuss how to handle certain kinds of external driving functions, namely exponential and sinusoidal driving. We will find a general formula to handle these cases, and touch on the phenomenon of *resonance*, a very important concept which we’ll discuss in more detail in a few lectures.

The method of *superposition*, which we saw already, will be an important tool for us again.

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