

CHAPTER OVERVIEW

3: Resonance

Resonance is a key concept in the production of sound in instruments and in acoustics. We will come across it many more times in this book. The **natural frequency** (f_0 , measured in *hertz*) is the frequency at which an oscillating system naturally wants to vibrate. For a mass on a spring, this is determined by the size of the mass and the stiffness of the spring; a stiffer spring has a higher natural frequency as we saw in the previous chapter. To keep a system vibrating in the presence of friction we have to keep pushing it with a periodic force. The frequency of this periodic driving force is called the **driving** frequency, f which is totally independent of the natural frequency (we can push our mass on a spring at a frequency different from the frequency at which it wants to vibrate).

Key Terms:

Natural frequency, driving frequency, angular frequency, damped harmonic motion, driven harmonic motion, resonance, resonator, Helmholtz resonance, Quality or Q-factor.

3.1: Resonance

3.1.1: Resonance Examples

3.1.2: A Few Other Examples of Resonance

3.1.3: Harmonic Motion and Resonance Simulation

3.2: Resonance Springs

3.2.1: Driven Springs Simulation

3.3: Quality Factor

3.3.1: Quality

3.3.2: Q-Factor Simulation

This page titled [3: Resonance](#) is shared under a [CC BY-NC-SA 3.0](#) license and was authored, remixed, and/or curated by [Kyle Forinash and Wolfgang Christian](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.