

BirZeit University
Faculty of Science-Department of Physics
Physics of waves and vibrations, Phys236
Spring 2018
Homework 2: Due date Mar. 10th 2018

1. An electric dipole attached to a massless rod of length b is placed in a uniform electric field \vec{E} .
 - (a) If the dipole is slightly rotated from its equilibrium position and then released. Show that the dipole will have a simple harmonic motion and find the natural frequency of the oscillation.
 - (b) If a damping torque proportional to the angular velocity of the dipole is present. Find the the frequency of the oscillation.

2. An object of mass $m = 0.2\text{Kg}$ is hung from a spring whose spring constant $s = 80\text{N/m}$. The object is subject to a resistive force probational to its velocity v , and is given by $-bv$, b is constant.
 - (a) Write an equation of motion to describe the system
 - (b) If the damped frequency is $\frac{\sqrt{3}}{2}$ of the natural frequency, what is the value of the constant b
 - (c) Find Q of the system.

3. For a certain physical system the equation of motion is given by:

$$m\ddot{x} - b\dot{x} + kx = 0$$

Discuss the solution of this equation and compare it to the results obtained in the class. b is positive constant.

4. Problem 2.8