

Problems from Lecture 3

Use the applets at:

<http://www.physics.purdue.edu/class/applets/phe/resonance.htm>

http://qbx6.ltu.edu/s_schneider/physlets/main/osc_damped_driven.shtml

to deepen your intuition about and understanding of the four paradigmatic types of harmonic oscillators:

the undamped free oscillator
the undamped driven oscillator
the damped free oscillator
the damped driven oscillator

- (1) How does the resonance frequency vary with k and m ?
- (2) How does the resonance width depend on the damping parameter $\gamma = b/2m$?
- (3) What is phase of the response versus the phase of the drive: (a) below resonance, (b) above resonance, and (c) at resonance?
- (3) How does the phase curve versus driving frequency vary with $\gamma = b/2m$?
- (4) How does the maximum amplitude vary with $\gamma = b/2m$?
- (5) How does the envelope of the position oscillations vary versus $\gamma = b/2m$?
- (6) How do $x(t)$, $v(t)$, and $E(t)$ decay versus $\gamma = b/2m$?