PHY2053 Announcements

- LAST DAY OF CLASS!
- Final exam:
  - April 25, Saturday, 10 am to noon
  - Room assignments:

last name	room
A-GAR	Computer science engineering A101
GEE-J	Fine Arts B 105
K-MAZ	Florida Gym 230
MCC-O	Florida Gym 260
P-R	Florida Gym 280
S-Z	Williamson 100

- roughly ½ of questions on topics covered in midterms, and the rest on Chapters 9, 13, 14

PHY2053 Announcements

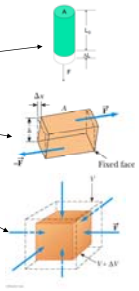
- Make-up exam: April 22 Wednesday, 7:20 – 9:10 pm, meet at Prof. Reitze's office (NPB 2265)
  - covers all material in the course
  - same format as the final - ½ new material from Ch. 9,13,14 and ½ from old material
- To take the make-up exam, you must obtain permission from Prof. Chan or Prof. Reitze.
- HW Set #11 due Wednesday, Apr 22

Final Exam Review

- Material from Exams 1 and 2 are covered in the earlier reviews
  - Exam 1 material – see review notes of 2/17/09 reviewslides1
  - Exam 2 material – see review notes of 3/31/09 reviewslides2
- I will cover material from Ch 9, 13, and 14

Chapter 9 - Solids and Fluids

- States of matter
- Strength of materials and elastic moduli
  - Young's modulus: $\frac{F}{A} = Y\frac{\Delta L}{L_o}$
  - Shear modulus: $\frac{F}{A} = S\frac{\Delta x}{h}$
  - Bulk modulus: $\Delta P = -B\frac{\Delta V}{V}$



- Pressure and Density
  - Pressure: $P = F/A$
  - Density: $\rho \equiv \frac{m}{V}$
  - Pressure and depth equation: $P = P_o + \rho gh$
    - Pressure depends only on depth

Chapter 9 - Solids and Fluids (cont'd)

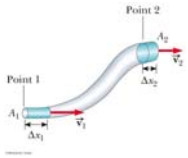
- Pressure Measurements: Simple barometers
- Buoyant Force: $B = \rho_{fluid} V_{fluid} g = w_{fluid}$
  - buoyant force equals the weight of the displaced fluid
  - For floating objects, the forces balance

$$\frac{\rho_{obj}}{\rho_{fluid}} = \frac{V_{fluid}}{V_{obj}}$$

Chapter 9 - Solids and Fluids (cont'd)

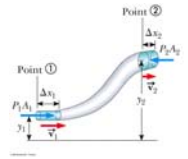
- Fluid flow
  - Equation of continuity:

$$A_1 v_1 = A_2 v_2$$



  - Bernoulli's Equation:

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$$

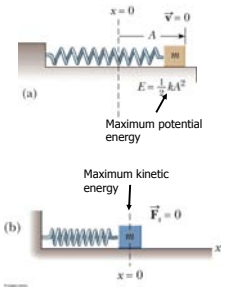


Chapter 9 – Exam material will come from Sections 9.1 – 9.7

Chapter 13 – Vibrations and Waves

- Begins with Hooke's Law: $F = -kx$
- Leads naturally to simple harmonic motion
  - oscillations between the positions $x = \pm A$
    - A is the amplitude
    - T is the period - time for the object to complete one cycle of motion
      - Different from tension!
    - f is the frequency - number of complete cycles per unit time

$$f = 1 / T$$



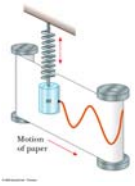
f measured in cycles/second (s^{-1}) or hertz (Hz)

Anywhere: $v = \pm\sqrt{\frac{k}{m}(A^2 - x^2)}$

Chapter 13 – Vibrations and Waves (cont'd)

- $x = A \cos \omega t$
- $v = -A\omega \sin \omega t$
- $a = -A\omega^2 \cos \omega t$
- $2\pi f = \omega$
- $\omega = \sqrt{\frac{k}{m}}$ $f = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$ $T = 2\pi\sqrt{\frac{m}{k}}$

$F = -kx = ma$

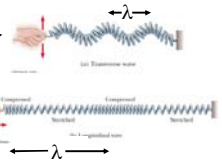


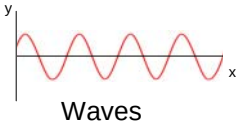
NB: kinematic equations don't work for SHM

• SHM: Simple pendulum $T = 2\pi\sqrt{\frac{L}{g}}$

Chapter 13 – Vibrations and Waves (cont'd)

- Waves
  - Transverse
  - Longitudinal
  - λ = wavelength
  - Wave velocity $c = \lambda/T = \lambda f$



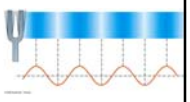


Waves

Chapter 13 – Exam material will come from Sections 13.1 – 13.5; 13.7 – 13.8

Chapter 14 – Sound

- Production of sound waves



- Characteristics of sound waves
  - Audible, infrasonic waves, ultrasonic
- Speed of Sound
  - Liquid: $v = \sqrt{\frac{B}{\rho}}$ Solid rod: $v = \sqrt{\frac{Y}{\rho}}$
  - General: $v = \sqrt{\frac{\text{elastic property}}{\text{inertial property}}}$
  - Speed of sound in air: $v = \left(331\ \frac{m}{s}\right)\sqrt{\frac{T}{273\ K}}$

Chapter 14 – Sound (cont'd)

- Doppler effect
  - source moves toward observer → frequency increases
  - source moves away from observer → frequency decreases
  - observer moves toward source → frequency increases
  - observer moves away from source → frequency decreases
  - Most general case: $f_o = f_s\left(\frac{v + v_o}{v - v_s}\right)$
    - v is the speed of the wave in the medium (typically air)
    - V_0 is the speed of the observer
      - $V_0 > 0$ when observer moves toward source; < 0 when observer moves away from source
      - $V_S > 0$ when source moves toward observer; < 0 when source moves away from observer

Chapter 14 – Exam material will come from Sections 14.1 – 14.3; 14.6