

PHY138 – Waves, Lecture 6

Today's overview

- Constructive and Destructive Interference
- Interference Patterns
- Beats

Reading Assignment

- Next week's reading is Knight **Chapter 23**, Sections 23.1 – 23.6. There is a pre-class quiz on www.masteringphysics.com for this material due on Monday morning. It is the *last* pre-class quiz of 2006.
- Waves Quarter **Written Team Problem Set** is due Friday by 5:00 PM in T.A. drop box. – You must work in the teams you've been assigned to in tutorial.

Message from Dr. Savaria... (again)

- If you have a conflict at 6:00-7:30 PM on Dec.5 and wish to write Test 2 at an alternate time:
 - Send an email to phy138y@physics.utoronto.ca confirming that you wish to re-register, if you registered for the alternate sitting of Test 1.
 - or
 - Visit April Seeley in MP129 or MP302 to register for the first time you will write in an alternate time.
- The deadline for confirming / registering is Nov.27 by 5:00PM.

“Lasers”: Standing Waves for Light

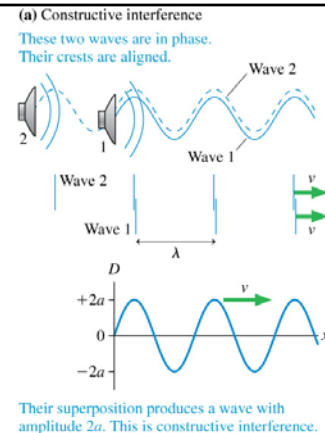
- Light Amplified by Stimulated Emission Radiation
- Eye surgery: corneal transplants, vision correction
- Heart surgery
- Laser imaging for diagnosis
- Laser dentistry

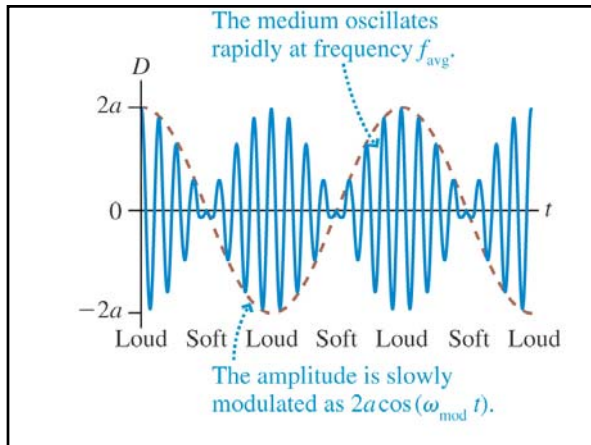
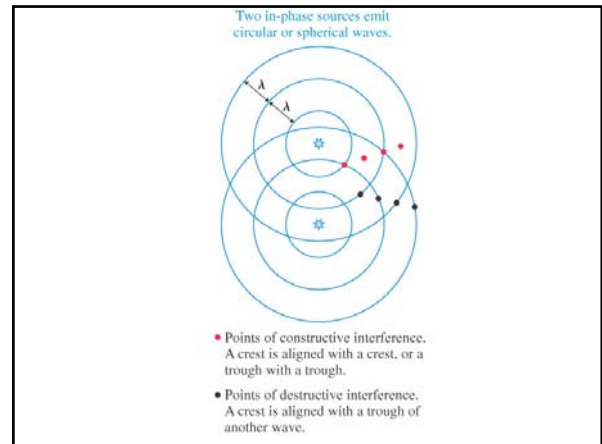
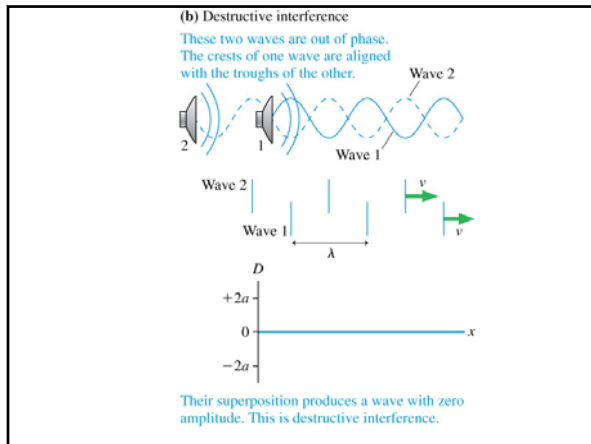
Wave Interference

- Two waves moving in the same direction with the same amplitude and same frequency form a new wave with amplitude:

$$A = \left| 2a \cos\left(\frac{\Delta\phi}{2}\right) \right|$$

where a is the amplitude of either of the individual waves, and $\Delta\phi$ is their phase difference.





Beat frequency

- Beats are loud sounds separated by soft sounds
- The beat frequency is the difference of the frequencies of the two waves that are being added:

$$f_{beat} = 2f_{mod} = |f_1 - f_2|$$
- The frequency of the actual sound is the average of the frequencies of the two waves that are being added:

$$f_{avg} = \frac{f_1 + f_2}{2}$$