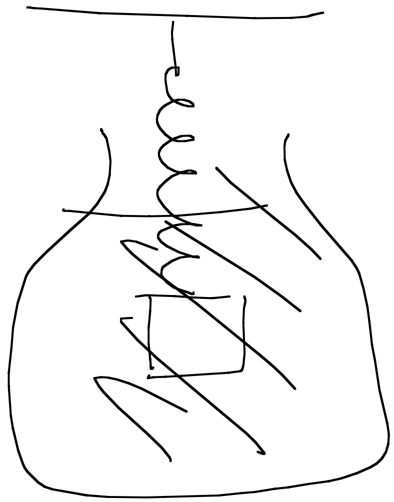
Phys 2110-3 11/24/10

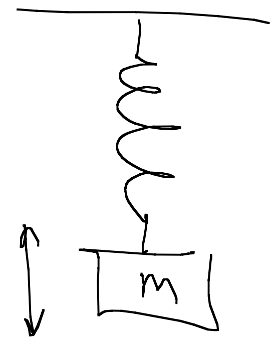
Note Title 11/24/2010

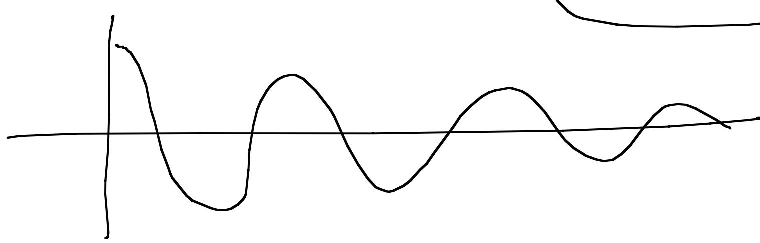
Chap 13

Damped h.o.

Friction force





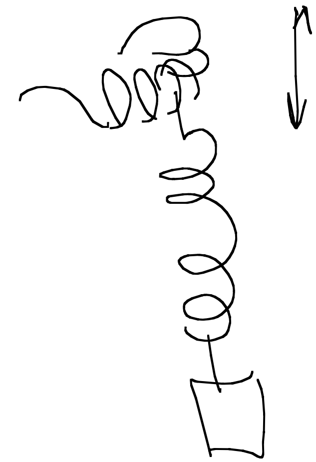
Driving force $F(t) = F_0 \cos \omega_0 t$

$\omega \equiv \sqrt{k/m}$

D.E.

$$m \frac{d^2x}{dt^2} = -kx - b\frac{dx}{dt} + F_0 \cos \omega_0 t$$

Driving force can be accomplished:



"Resonance": Driving frequency matches natural frequency, Amplitude can be large ... Go study this.

---

Chap 14

Lots of material!

Wave motion: Class of phenomena

Waves on string, waves on water, sound waves, light waves.

All of these transmit energy ove long distances

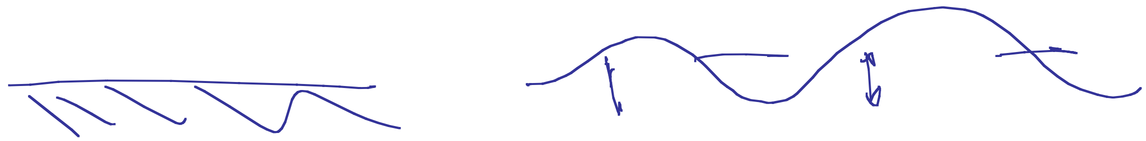
Elastic medium has deformations of some kind, result is a disturbance which travels over long distances. That is the wave.

String:

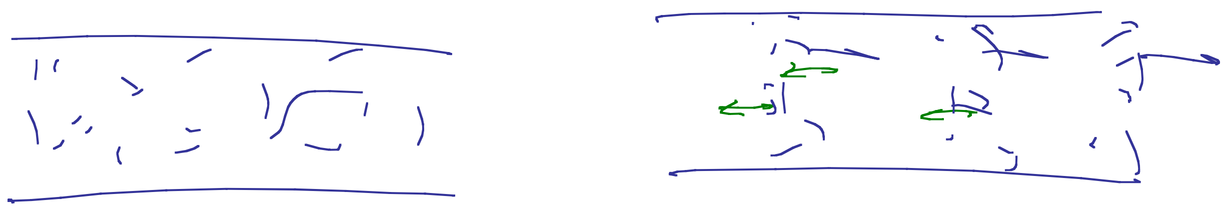
Different media.

Diff. kinds of disturbances.

String slinky

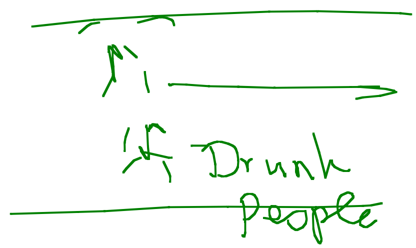


water



sound

Stadium




people.

Light wave

Maxwell 1867

Disturbance in..

Electric & Magnetic fields

Medium: "Ether"

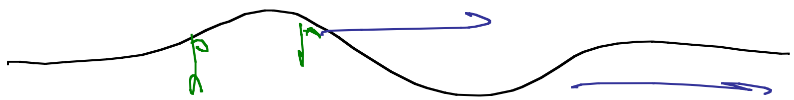
1905 Einstein, relativity

→ No medium.

Mechanical waves

Next semester (Math is similar in places)

Waves in elastic medium



Two kinds

1) Transverse wave

Motion of medium is perp to wave motion

string . - Slinky

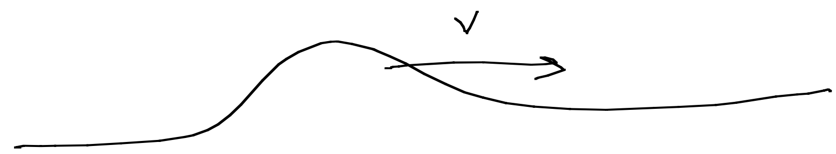
2) Longitudinal Wave

Motion of medium is along the wave motion

Slinky, Sound

Assumptions:

Wave keeps same shape.




Idealization.

Speed is same for all wave.

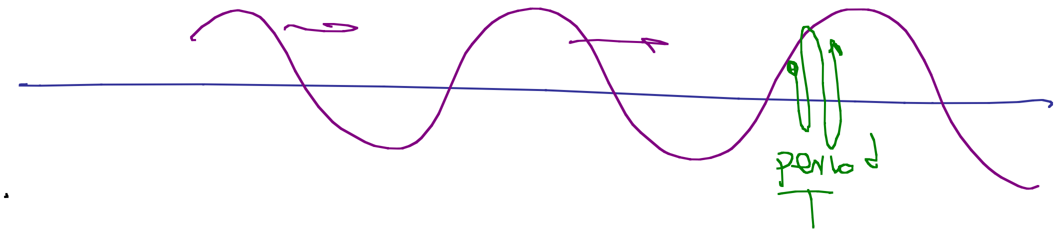
Non-dispersive media.

Often we deal with wave pulses

Finite extent.

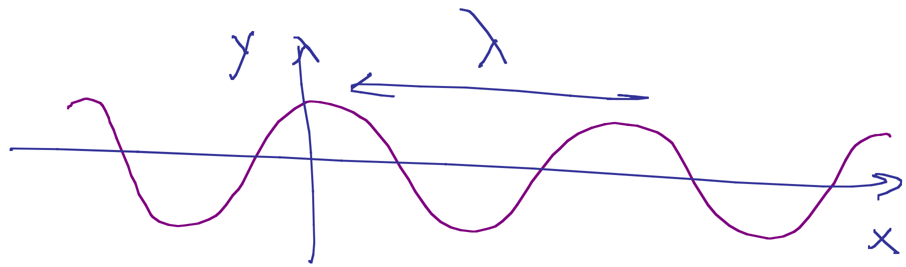
Or: Continuous Waves, Periodic

Repeats in space & time.




Two ways to look at such a waves

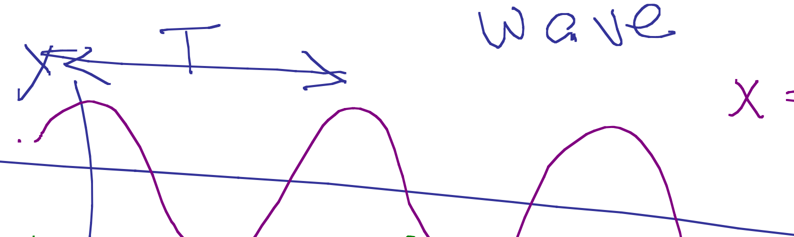
**Snapshot**




λ = wavelength of wave

**Fixed position**

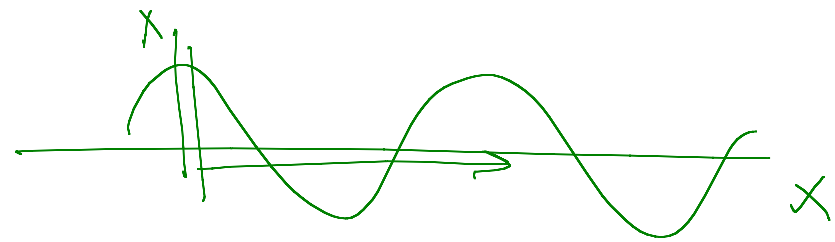
$x = 7.193\,m$




T = period. $f = \frac{1}{T}$  $\omega = 2\pi f$

$\lambda$, $T$, $f$, $\omega = 2\pi f$

$k = \dfrac{2\pi}{\lambda}$ wave number




$kx$ gives phase for snapshot picture

$k = 1/\lambda$