Lecture 4

Mechanical waves

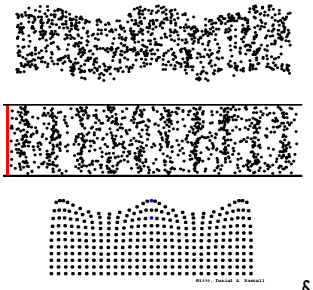
Pre-reading: §15.1–15.2

Mechanical Waves

Transverse

Longitudinal

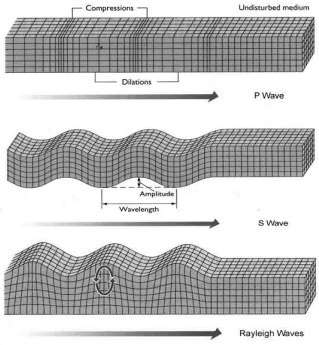
Trans. + Long.



Figures courtesy D. Russell

§15.1

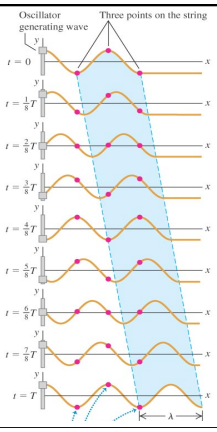
Types of earthquake waves



General Properties of Mechanical Waves

- Need to distinguish **medium** from **particles**
- shape of pattern (pulse, continuous, standing wave)
- speed of wave (or pattern)
- energy transmitted (related to amplitude)
- number of dimensions (rope; pond; speakers)

§15.2



Periodic Waves

- Created by continuous, sinusoidal pulses
- restoring force could be tension, pressure, etc.
- Characterised by
  - wavelength (λ) or angular wavenumber (k)
  - period (T) or frequency (f) or ang. freq. (ω)
- Speed of wave pattern is $v = f\lambda = \omega/k$

§15.3

Speed and wavelength

- Sound consists of longitudinal waves in air. At 20° C, $v = 344\ \text{ms}^{-1}$. What is the wavelength for middle C ($f = 262$ Hz)?

Next lecture

The wave equation

Read §15.3–15.4