Physics 8.03 Vibrations and Waves

Lecture 8
Boundary Conditions Applied to
Pulses and Waves

Last time:
Wave Equation and its Solutions

- Waves ➜ oscillations in space and time
  - $y(x, t)$
  - Transverse or longitudinal waves
  - Traveling or standing waves
- Solutions to wave equation
  - Pulses of arbitrary shape ➜ $y(x, t) = f(x \pm v\,t)$
  - Harmonic pulses ➜ $y(x, t) = y_0 \cos(k(x \pm v\,t) + \phi)$
  - Separable solutions

Boundary Conditions

- What happens to a pulse when it reaches the end of the string?
  - Reflection and transmission
- Other wave equation solutions and b.c.
  - Harmonic pulses ➔ $y(x, t) = y_0 \cos(k(x \pm vt) + \phi)$ (traveling waves)
  - Separable solutions ➔ $y(x, t) = f(x) \cos(\omega t + \phi)$ (standing waves)
- Energy carried by waves