Lecture 9, Sep 27, 2022

Multiple Coupled Oscillators

- For N coupled masses we need to solve for the eigenvalues of an $N \times N$ matrix
- For a symmetrical system we can always factor out $\omega^2 - 2\dfrac{k}{m}$
- For a system of 3 oscillators, the frequencies are $\omega^2 = \dfrac{2k}{m}$ or $\dfrac{k}{m}\left(2 \pm \sqrt{2}\right)$

Coupled Forced Oscillations

- Consider a system of coupled spring oscillators where the end is driven by $\xi(t) = \xi_0 \cos(\omega t)$
  - The mass at the end gets an extra term, but the other masses have the same equation of motion
- It turns out we just get the regular driven oscillator, now with $x_A + x_B$ and $x_A - x_B$
  - Resonance occurs near any of the normal mode frequencies
  - When driving frequency is close to ω_1 the masses oscillate in phase; when it's close to ω_2 they oscillate out of phase