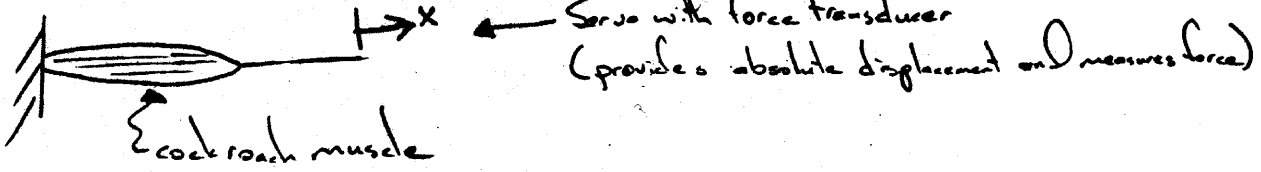
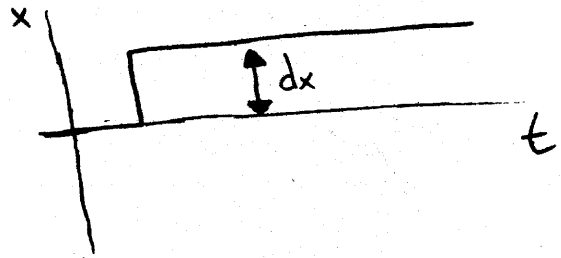
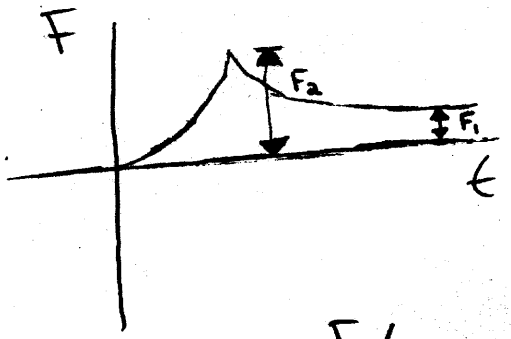
Biologist's Mechanical Measurements

- **Setup**



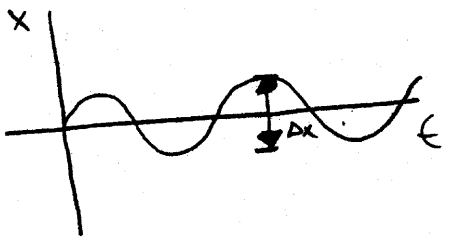
- **Perturbation Measurements** (Stiffness ○ Quasi-Stiffness)

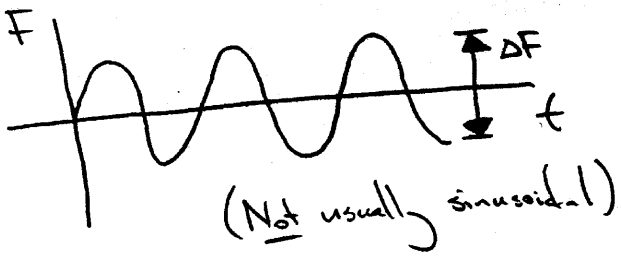




$$\text{Stiffness} = F_1/dx \qquad \text{Quasi-Stiffness} = F_2/dx$$

- **Sinusoidal Analysis**





(Not usually sinusoidal)

$$\text{Complex Stiffness} = \Delta F/\Delta x$$

$$\text{Complex Modulus} = \frac{\Delta F/A}{\Delta x/L}$$

A = muscle area
L = muscle rest length

Phase Angle = phase difference between max displacement and max force (usually leading)

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