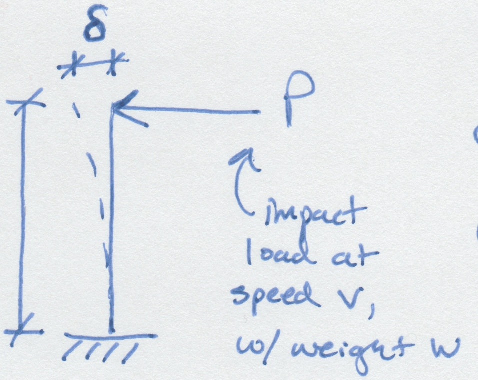
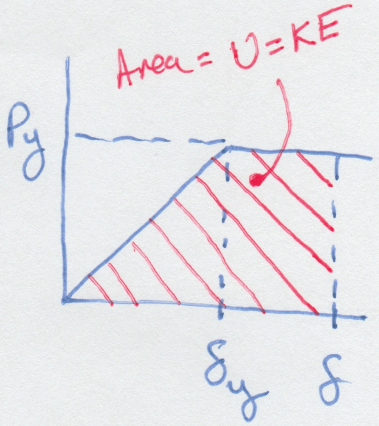


Kinetic Energy, $KE = \boxed{\frac{1}{2}\left[\frac{W}{g}\right]v^2}$ (1)

Conservation of Energy $\rightarrow KE = U$

U = strain energy = work done by P



Assume perfectly elastic-plastic response, where P_y is the load that causes the post to fully yield.

$$M_y = F_y Z = P_y L \rightarrow P_y = \boxed{\frac{F_y Z}{L}} \quad (2)$$

$$\delta_y = \frac{P_y L^3}{3EI} = \boxed{\frac{F_y Z L^2}{3EI}} \quad (3)$$

F_y = yield stress
Z = plastic modulus

Assuming the post yields and continues to deflect, the work done by P is equal to the area under the P-δ graph, which is:

$$U = \frac{1}{2} P_y \delta_y + (\delta - \delta_y) P_y$$

Solve for δ: $\frac{U}{P_y} = \frac{1}{2}\delta_y + \delta - \delta_y \rightarrow \delta = \frac{U}{P_y} + \frac{1}{2}\delta_y$

Setting $U = KE \Rightarrow$ (1) and $P_y \Rightarrow$ (2) and $\delta_y \Rightarrow$ (3), you can solve for δ.