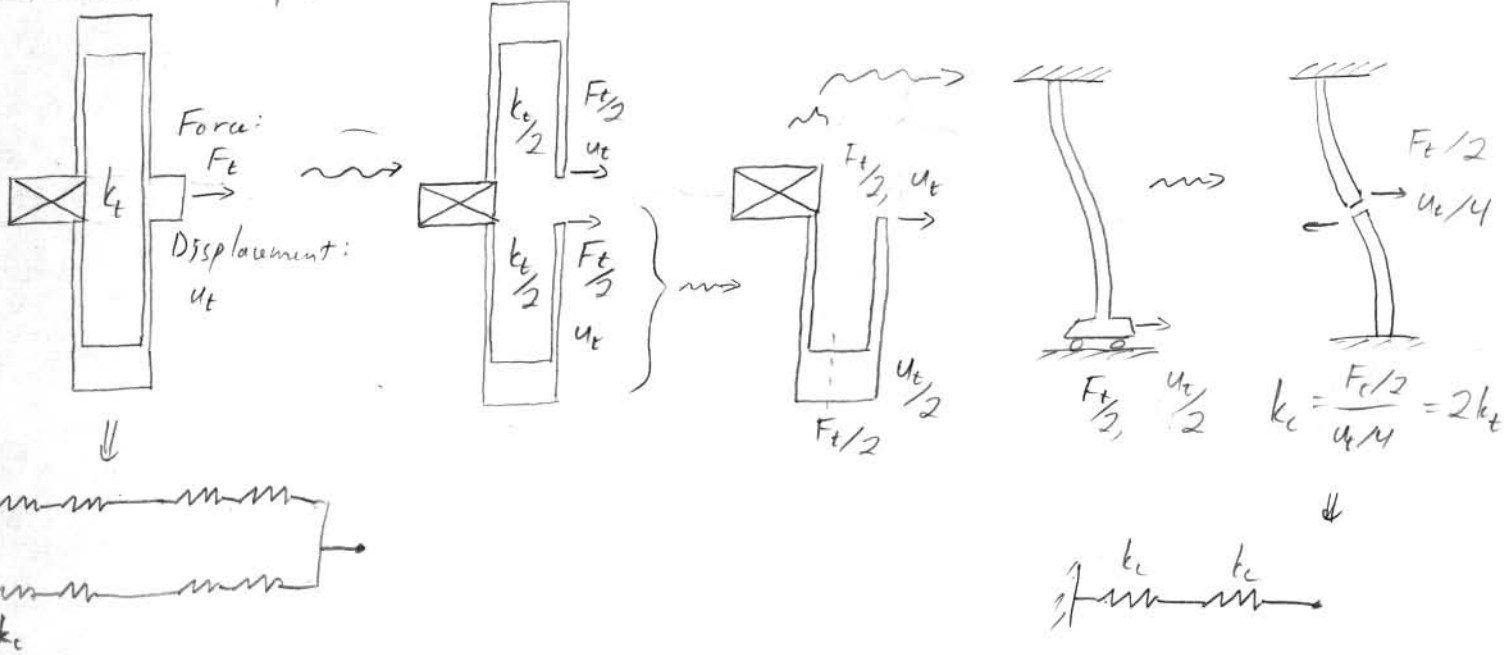
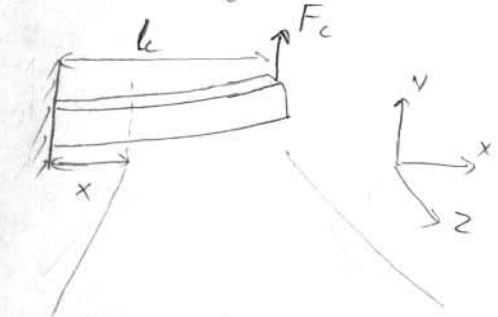
EE C245 Discussion, 10/20/2008 | Ilya Gurin

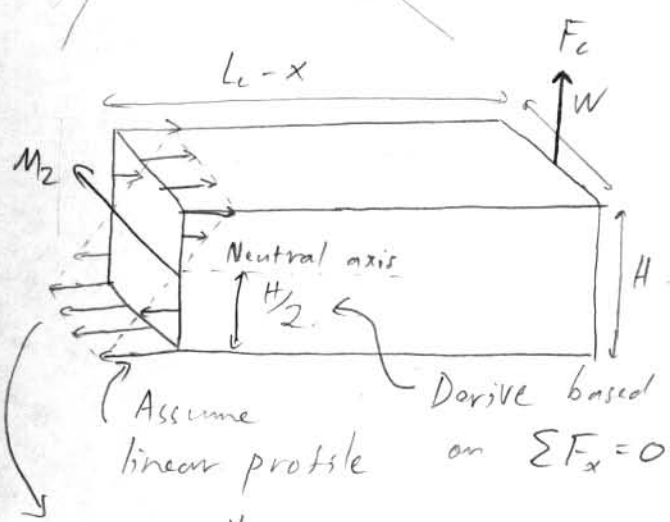
Extended example: folded-flexure stiffness



Now find k_c:

Does normal or shear stress cause this deflection?

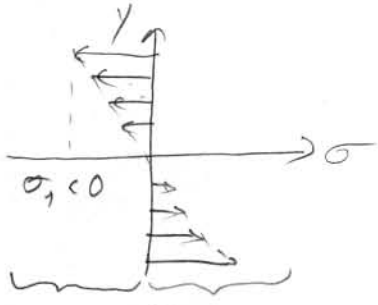




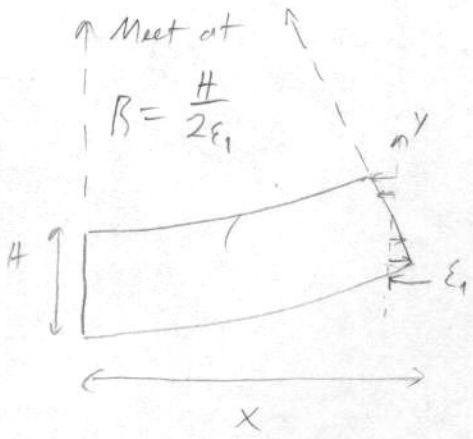
Impose equilibrium conditions:

$$\Sigma F_y = 0$$

$$\Sigma M_z = 0 \Rightarrow \iint y\, dF = F_c (L_c - x)$$



Deformed shape:



Small-deflection approximation:
arc ≈ parabola

$$\frac{d^2v}{dx^2} = \frac{1}{R} = \frac{2\varepsilon_1}{H}$$

$$\Rightarrow v_0 = \frac{1}{3}\frac{F_c L_c^3}{EI}$$

$$\Rightarrow k_c = \frac{L_c^3}{EI}$$

$$\Rightarrow k_t = \frac{L_c^3}{6EI}$$