

Effective stiffness in the direction of F .

We want to look for $F = \underline{k} \delta + \dots$

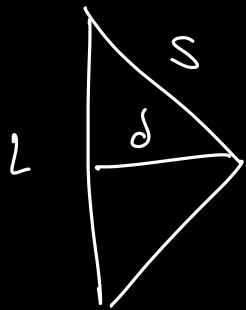
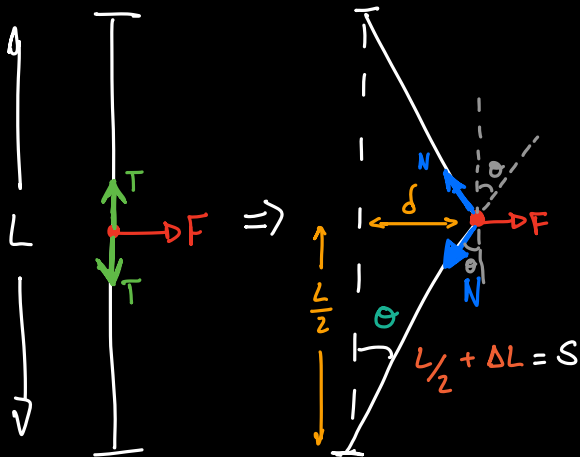
From equilibrium: $F = 2N \sin \theta = 2N \frac{\delta}{S}$

We need N : $N = T + \sigma A = T + E \epsilon A$

↑
Axial
Force
Cable

↑
Stress
 $= E \epsilon$

↑
Extension
per unit length
 $\Delta L / (L/2)$



$$S = \sqrt{\frac{L^2}{4} + \delta^2}$$

$$\Delta L = \sqrt{\frac{L^2}{4} + \delta^2} - L/2$$

$$\Delta L = \sqrt{\frac{L^2}{4} + \frac{L^2}{4} \tan^2 \theta} - L/2$$

$$\frac{\Delta L}{(L/2)} = \sqrt{1 + \tan^2 \theta} - 1$$

$$N = T + EA \left(\frac{1}{\cos \theta} - 1 \right)$$

$$F = 2N \frac{\delta}{S} = \underbrace{\frac{2T\delta}{S}}_{\sim k} + \frac{2EA\delta}{S} \left(\frac{1}{\cos \theta} - 1 \right)$$

$\cos \theta = f(\delta)$

$$k = \frac{2T}{S}$$