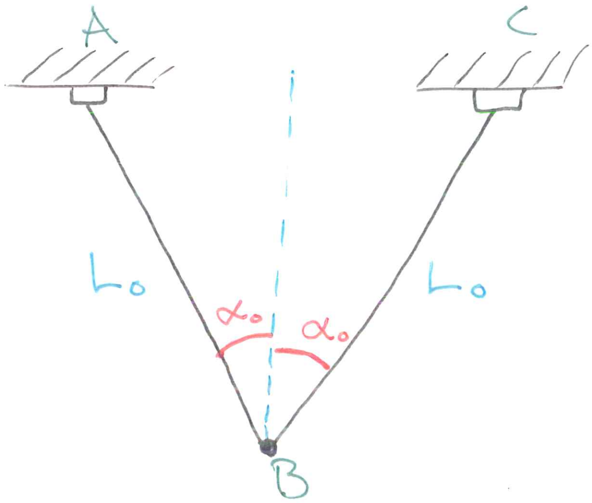
KAPITEL 1

1.1

$$\alpha_0 = \frac{\pi}{2}, \quad \Delta << L_0$$

Beräkna töjningen i stängerna



Pythagoras sats:

$$(L_0+\varepsilon)^2 = (L_0\cos\alpha_0 + \Delta)^2 + (L_0\sin\alpha_0)^2$$

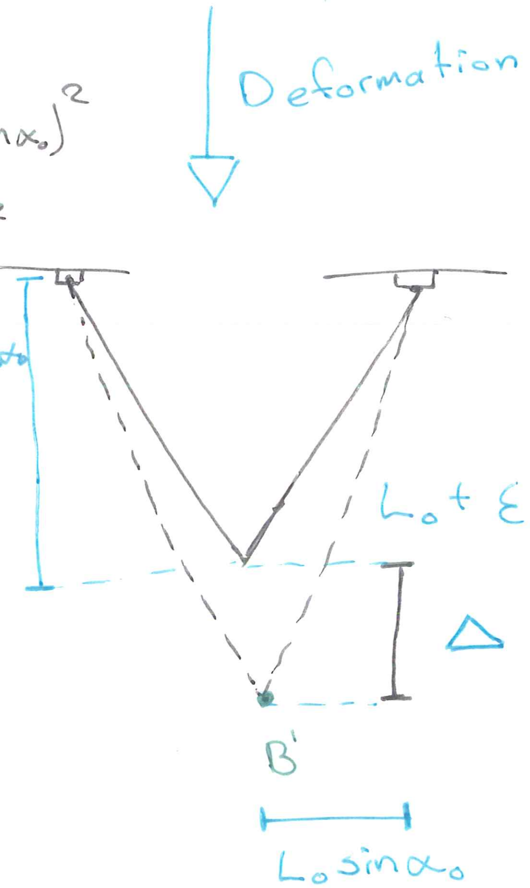
$$\Leftrightarrow (L_0+\varepsilon)^2 = L_0^2(\cos^2\alpha_0 + \sin^2\alpha_0) + 2L_0\Delta\cos\alpha + \Delta^2$$

$$\Leftrightarrow (L_0+\varepsilon)^2 = L_0^2 + 2L_0\cos\alpha_0 + \Delta^2$$

$$\Leftrightarrow \varepsilon = \sqrt{L_0^2 + 2L_0\cos\alpha_0 + \Delta^2} - L_0$$

SVAR

$$\Leftrightarrow \boxed{\varepsilon = \sqrt{1 - \frac{2\cos\alpha_0}{L_0} + \left(\frac{\Delta}{L_0}\right)^2} - 1}$$

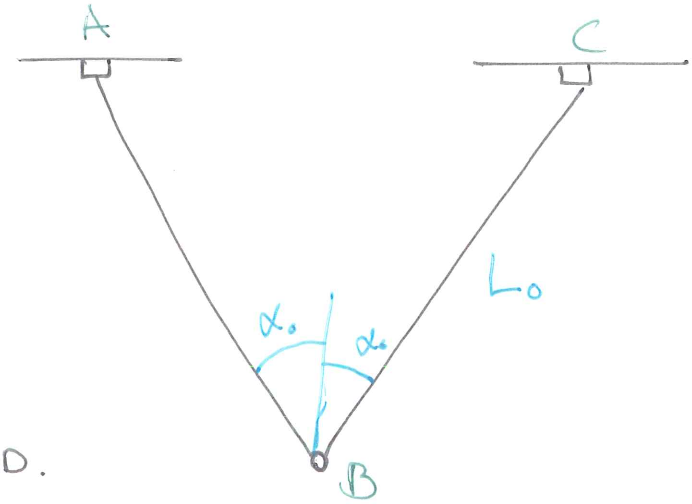


$$\alpha_0 = \frac{\pi}{2} \Rightarrow \boxed{\varepsilon = \sqrt{1 + \left(\frac{\Delta}{L_0}\right)^2} - 1}$$

$$\Delta << L_0 \Rightarrow \varepsilon = \sqrt{1 - \frac{2\cos\alpha_0}{L_0}} - 1 \approx \frac{\delta}{L_0}\cos\alpha$$

1.3

Samma som i 1.1, fast med förskjutning δ åt höger.



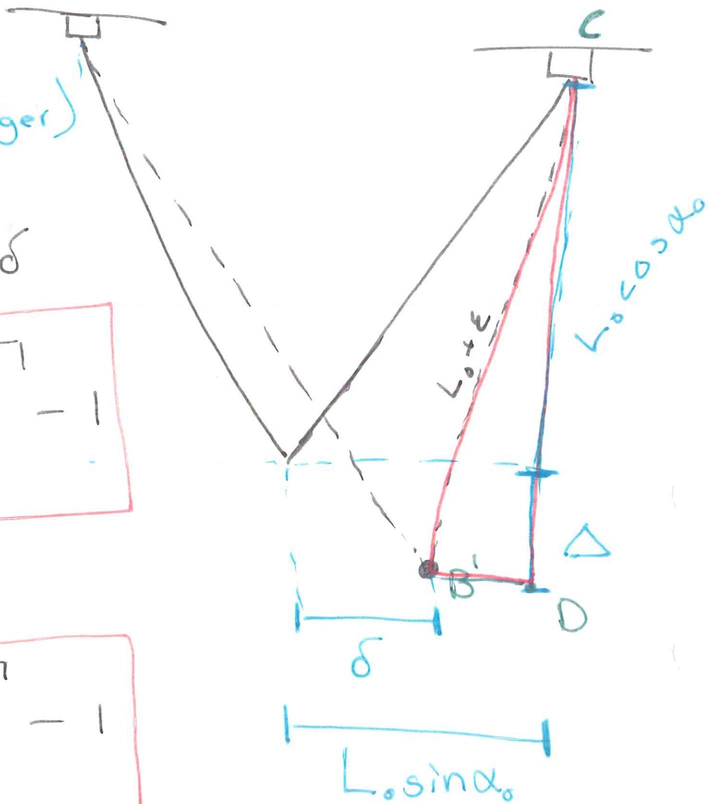
Jag tittar på den rödmarkerade triangeln CB'D.

Deform.

Pythagoras sats

$$(L_0+\varepsilon_{BC})^2 = (L_0\cos\alpha_0+\Delta)^2+(L_0\sin\alpha_0-\delta)^2$$

$$= L_0^2+\Delta^2+\delta^2+2L_0(\cos\alpha_0\Delta-\sin\alpha_0\delta)$$



$\Delta = 0$ (endast förskj. åt höger)

$$\Rightarrow (L_0+\varepsilon_{BC})^2 = L_0^2+\delta^2-2L_0\sin\alpha_0\delta$$

$$\Leftrightarrow \boxed{\varepsilon_{BC} = \sqrt{1-2\frac{\delta}{L_0}\sin\alpha_0+\left(\frac{\delta}{L_0}\right)^2}-1}$$

På samma sätt fås:

$$\boxed{\varepsilon_{BA} = \sqrt{1+2\frac{\delta}{L_0}\sin\alpha_0+\left(\frac{\delta}{L_0}\right)^2}-1}$$