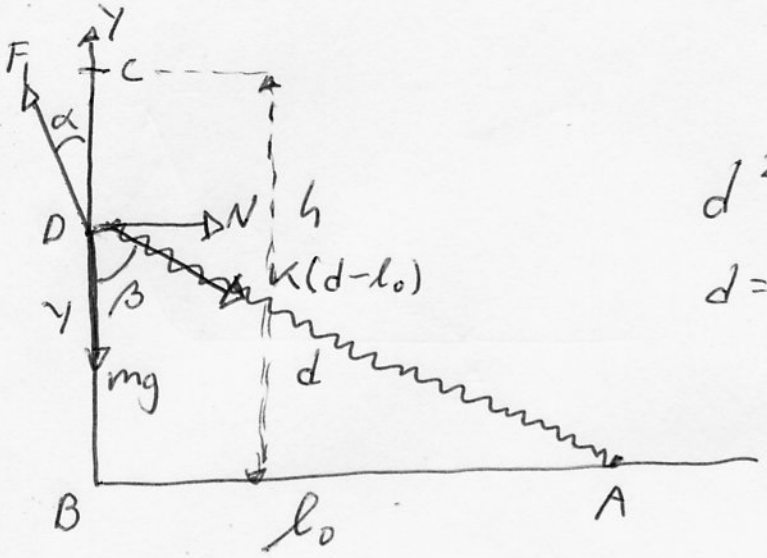
9.81



$$d^2 = y^2 + l_0^2$$

$$d = (y^2 + l_0^2)^{1/2}$$

Lagen om kinetiska energin: $U_{B-C} = T_C - T_B$

$$T_B = \frac{1}{2} m v_B^2 = 0 \quad T_C = \frac{1}{2} m v_C^2$$

$$U_{B-C} = \int_{\bar{r}_B}^{\bar{r}_C} \bar{F}_1 \cdot d\bar{r} + \int_{\bar{r}_B}^{\bar{r}_C} m\bar{g} \cdot d\bar{r} + \int_{\bar{r}_B}^{\bar{r}_C} \underbrace{\bar{N} \cdot d\bar{r}}_{\perp} + \int_{\bar{r}_B}^{\bar{r}_C} K(d-l_0)\bar{e}_{DA} \cdot d\bar{r}$$

$$U_{B-C} = \int_0^h F_1 \cos\alpha \, dy + \int_0^h -mg \, dy + 0 + \int_0^h -K(d-l_0)\cos\beta \, dy$$

$\cos\alpha = \text{konst}$ ty $\alpha = \text{konst}$ $\quad \cos\beta = \frac{y}{d} = \frac{y}{(y^2+l_0^2)^{1/2}}$

$$-K\int_0^h (d-l_0)\cos\beta \, dy = -K\int_0^h [(y^2+l_0^2)^{1/2} - l_0]\, y\,(y^2+l_0^2)^{-1/2} dy =$$

$$= -K\int_0^h y\,dy + Kl_0 \int_0^h y\,(y^2+l_0^2)^{-1/2} dy =$$

$$= -K\frac{h^2}{2} + Kl_0 \frac{1}{2}\underbrace{[(y^2+l_0^2)^{1/2}]_0^h}_{(h^2+l_0^2)^{1/2} - l_0^2}$$

$$U_{B-C} = F_1 h\cos\alpha - mgh - K\frac{h^2}{2} + \frac{1}{2}Kl_0\sqrt{h^2+l_0^2} - \frac{1}{2}Kl_0^2$$

$$F_1 h\cos\alpha - mgh - K\frac{h^2}{2} - \frac{Kl_0^2}{2} + \frac{Kl_0}{2}\sqrt{h^2+l_0^2} = \frac{1}{2} m v_C^2$$

$$\boxed{v_C = \sqrt{\frac{2F_1 h\cos\alpha}{m} - 2gh - \frac{2Kl_0}{m}\left(l_0 + \frac{h^2}{2l_0} - \sqrt{h^2+l_0^2}\right)}}$$

GK