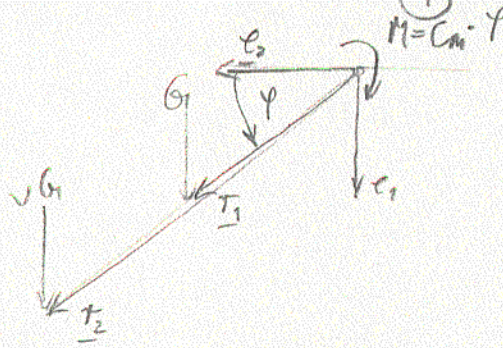


(4)

a)



$$\underline{M} = M \underline{e}_3$$

$$\delta A = \underbrace{-M \delta \varphi}_{(1)} + \underbrace{G_1 \frac{l}{2} \cos \varphi \delta \varphi + G_2 l \cos \varphi \delta \varphi}_{(1)} \quad (1)$$

$$\left\{ -C_M \cdot \varphi + G_1 l \left\{ \frac{1}{2} + u \right\} \cos \varphi \right\} \stackrel{!}{=} 0 \quad (1)$$

$$\underline{T}_1 = \frac{l}{2} \cdot (\sin \varphi \underline{e}_1 + \cos \varphi \underline{e}_2)$$

$$\delta \underline{T}_1 = \frac{l}{2} (\cos \varphi \underline{e}_1 - \sin \varphi \underline{e}_2) \delta \varphi$$

$$\underline{T}_2 = l (\quad)$$

$$\delta \underline{T}_2 = l (\cos \varphi \underline{e}_1 - \sin \varphi \underline{e}_2) \delta \varphi \quad (1)$$

b) speziell $u = \frac{1}{2}, C_M = \frac{1}{4} G_1 l \Rightarrow G_1 l \left\{ -\frac{1}{4} \varphi + 1 \cdot \cos \varphi \right\} = 0 \Leftrightarrow \cos \varphi = \frac{1}{4} \varphi \quad (1)$

aus drei Stellen auf dem Aufgabenblatt.

$$\left. \begin{aligned} \varphi_1 &\approx 70^\circ \\ \varphi_2 &\approx -120^\circ \\ \varphi_3 &\approx -200^\circ \end{aligned} \right\} (1)$$

$$\delta^2 A = G_1 l \cdot \left(-\frac{1}{4} - \sin \varphi \right) \quad (1)$$

$$\left. \begin{aligned} \delta^2 A(\varphi = \varphi_1) &< 0 && \text{stabil} \\ \delta^2 A(\varphi = \varphi_2) &> 0 && \text{labil} \\ \delta^2 A(\varphi = \varphi_3) &< 0 && \text{stabil} \end{aligned} \right\} (1)$$