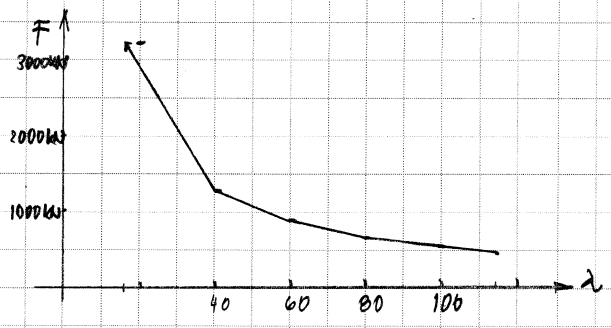
Aufgabe 1

a) $F_{max} = 1.35\ MN$

b) $S_{GE} = -3.12\ MN$; $S_{GF} = 2.24\ MN$

c) $S_{BE} = 5.97\ MN$

d) $F(\lambda) = \frac{51'286\ kNm}{\lambda}$



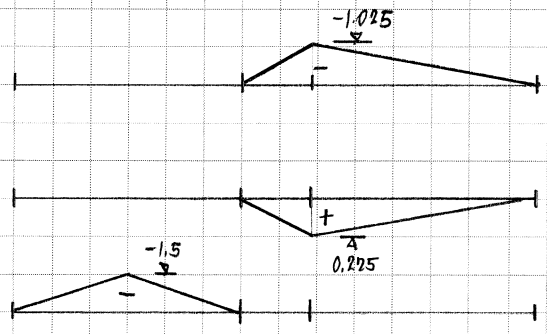
$\lambda = 16m$	$F = 3205kN$
$\lambda = 40m$	$F = 1282\ kN$
$\lambda = 60m$	$F = 855\ kN$
$\lambda = 80m$	$F = 641\ kN$
$\lambda = 100m$	$F = 513\ kN$
$\lambda = 117m$	$F = 438\ kN$

Aufgabe 2

a)

b)

c)



$\eta_{S_{BE}} = -1.025$

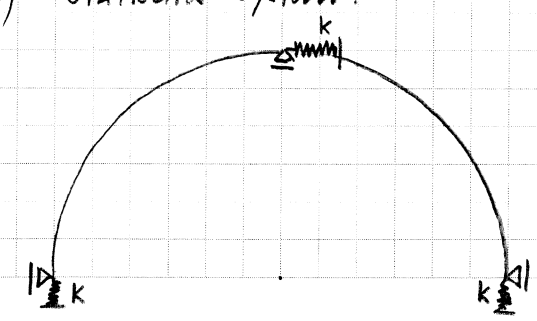
$\eta_{S_{DE}} = \frac{9}{40} = 0.225$

$\eta_{S_{FG}} = -\frac{3}{2} = -1.50$

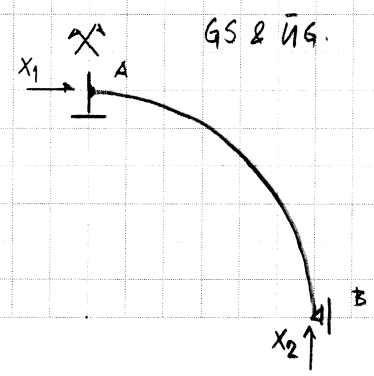
Aufgabe 3

a) $K = 3\frac{EI}{h^3}$

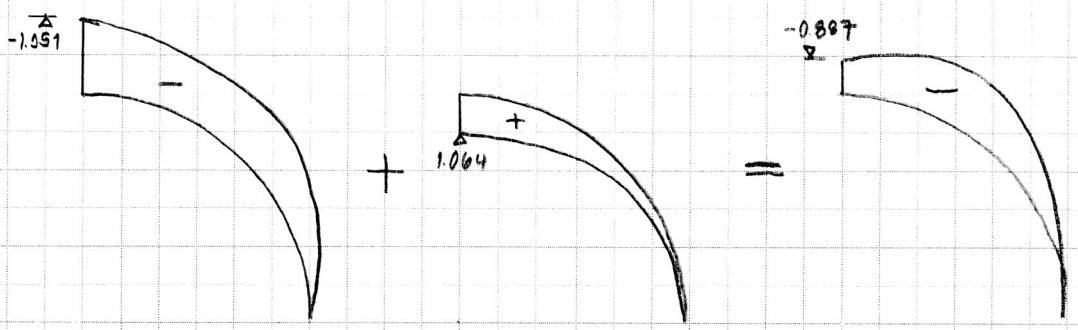
b) statisches System:



GS & ÜG.



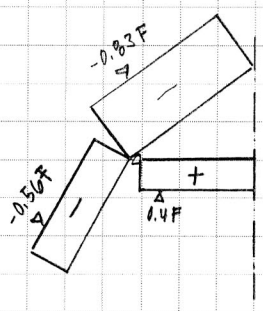
c) Momentenbeanspruchung.



Aufgabe 4

a) $n = 4$

b) $EA \to \infty$ $\quad w_1 = 0, \quad \varphi_1 = 0$



$N_{23} = -0.83\,F$

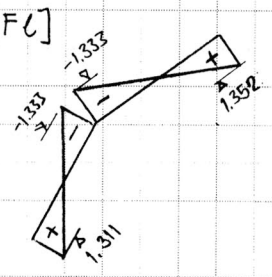
$N_{24} = 0.40\,F$

$N_{12} = -0.56\,F$

M und V für alle Stäbe identisch null!

c) $EA \to 0$ $\quad w_1 = 3.653 \frac{F\ell^2}{EI}, \quad \varphi_2 = -0.1851 \frac{F\ell^2}{EI}$

M [Fℓ]



$M_{12} = -1.311\,F\ell$

$M_{21} = -1.333\,F\ell$

$M_{23} = +1.333\,F\ell$

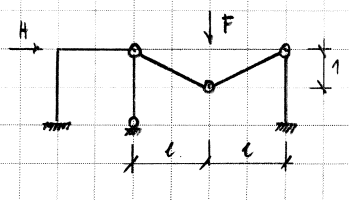
$M_{32} = +1.352\,F\ell$

d) $EA = 0.1168 \frac{EI}{\ell^2} \Rightarrow \underline{\underline{N = 0.2F}}$

Aufgabe 5

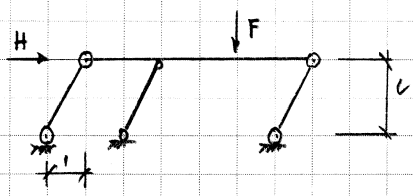
a) Anzahl Grundmechanismen : 2

b) 1. Grundmechanismus (Balken) :



$F_K = 4 \frac{M_u}{l}$

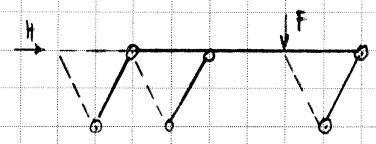
2. Grundmechanismus (Verschiebe) :



$H_k = 4 \frac{M_u}{l}$

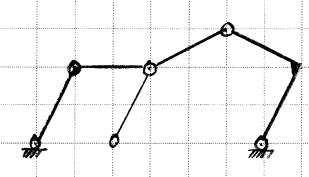
3. Kombination aus GM 1 + GM 2 :

Fall a) : H^+ und F^+ / H^- und F^-



$H_k = 4 \frac{M_u}{l}$

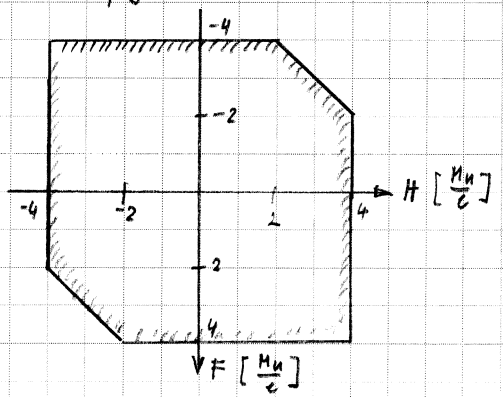
Fall b) : H^+ und F^- / H^- und F^+



$H_k - F_k = 6 \frac{M_u}{l}$

$-H_k + F_k = 6 \frac{M_u}{l}$

Fliessfigur :



c) falls $F_u = 4 \frac{M_u}{l}$

$\Rightarrow -2 \frac{M_u}{l} \leq H_u \leq 4 \frac{M_u}{l}$

Aufgabe 6

a) $F_{cr} = \frac{EI\pi^2}{(0.6992\,l)^2}$

b) $F_{cr} \cong \frac{EI}{13/12\,l^2} \cong \frac{EI\pi^2}{(3.27\,l)^2}$