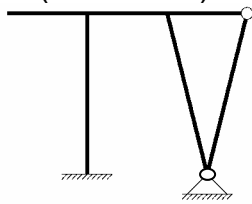
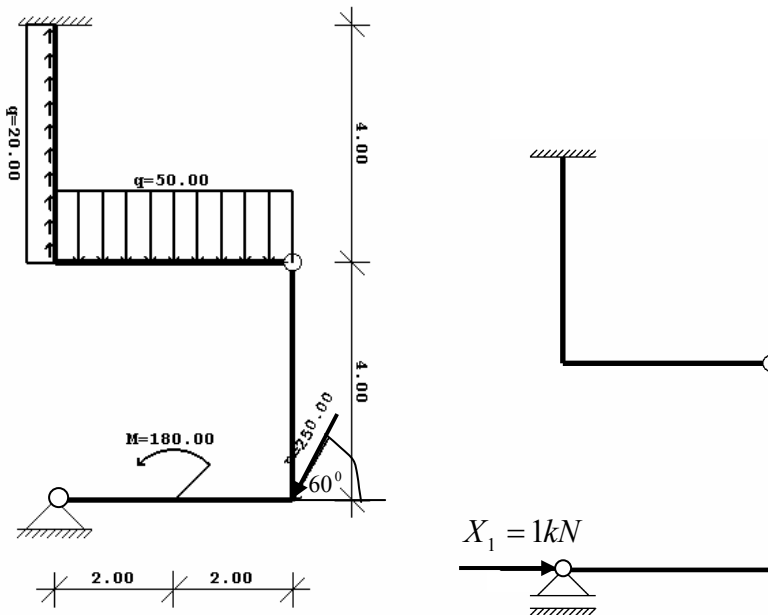


1. Odrediti stupanj statičke neodređenosti zadanog sustava te presijecanjem unutarnjih i vanjskih veza nacrtati dva statički određena sustava. (10 bodova)



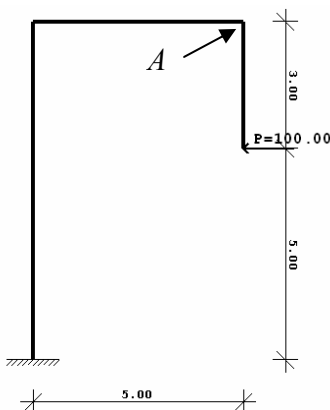
2. Za sustav na slici **METODOM SILA** odrediti dijagrame unutarnjih sila (M, T i N). Pri izračunu koeficijenta fleksibilnosti uzeti u obzir utjecaj **momenta savijanja** na deformiranje sustava. Dimenzije elemenata sustava su $b/h = 20/30$ cm, $E = 3.15 \cdot 10^7$ kN/m². (50 bodova).

Za izračunavanje koristiti **zadani osnovni sustav**.

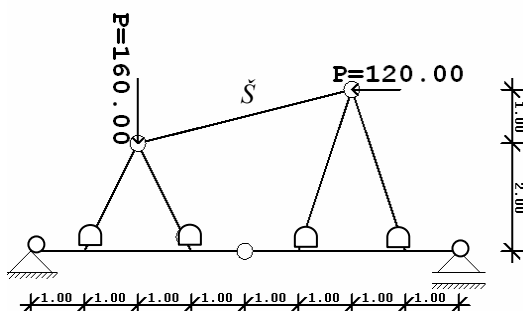


osnovni sustav za rješavanje

3. Odredite vertikalni pomak točke A. Dimenzije elementa su $b/h = 0.20/0.30$ m, $E = 3.15 \cdot 10^7$ kN/m². (20 bodova)



4. Odredite vrijednost sile u označenom štapu ojačane grede. (20 bodova)

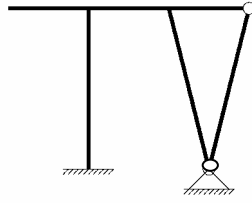


Napomena:

Na usmeni dio ispita može se pristupiti **s 50 i više bodova** iz pismenog dijela, ali pod uvjetom da iz **2.zadatka** treba sakupiti **najmanje 25 bodova**.

PRORAČUN KONSTRUKCIJA –19. lipnja 2007.
RJEŠENJA

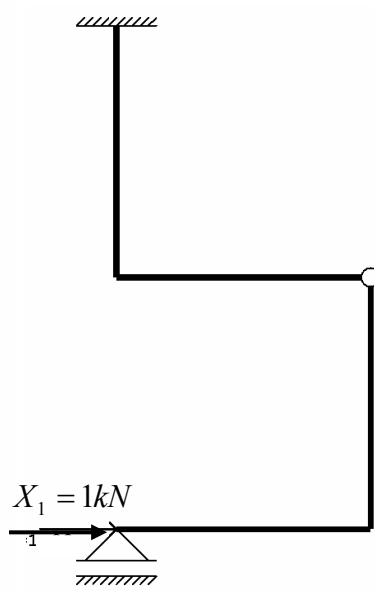
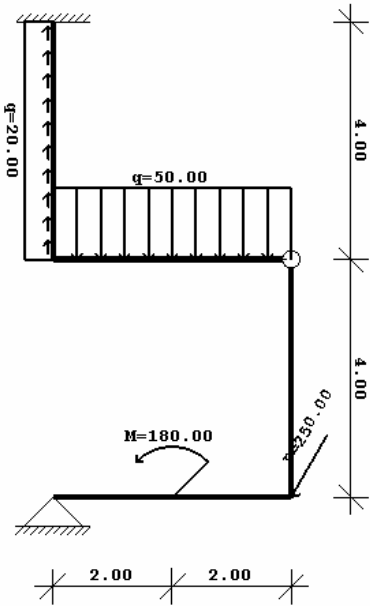
1. Neodređenost



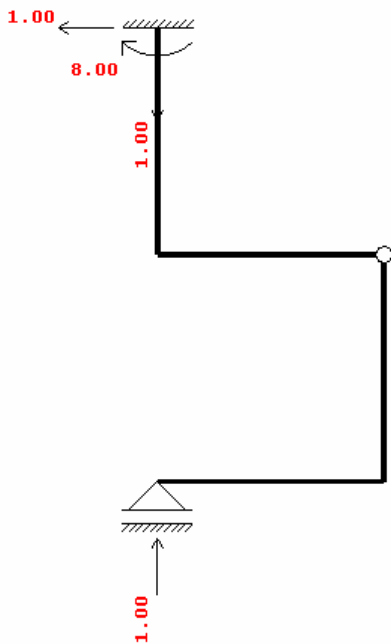
3x neodređen

2. Metoda sila
zadani sustav

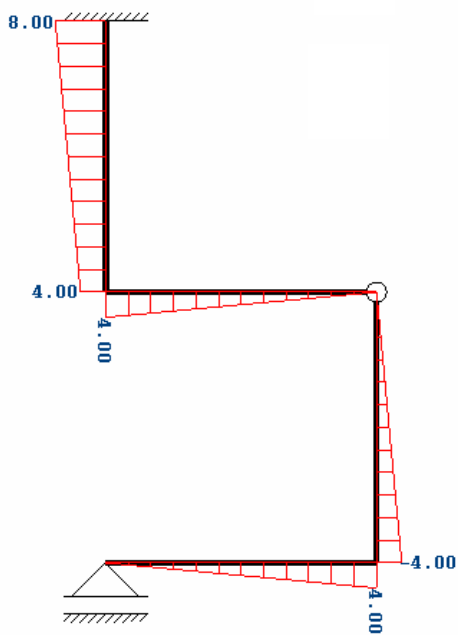
jedinično opterećenje na osnovnom sustavu



reakcije na osnovnom sustavu

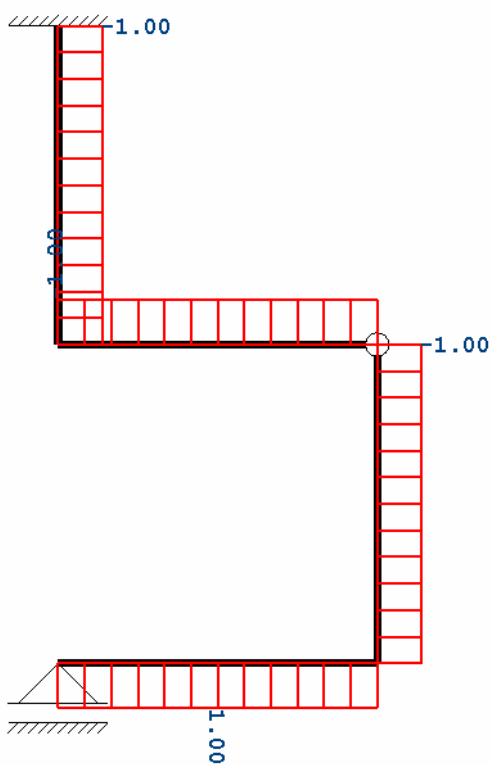


dijagrami na osnovnom sustavu
m1

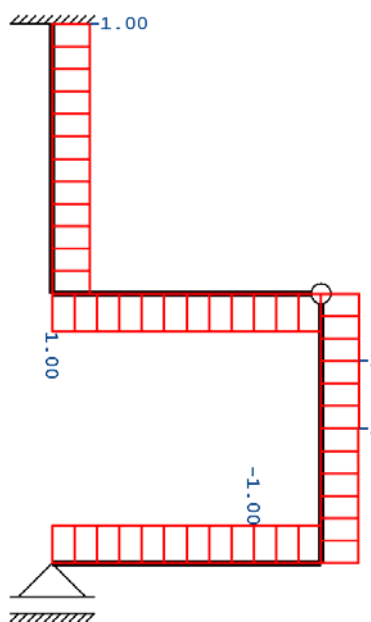


$$a_{11} = 213.34/EI$$

t1



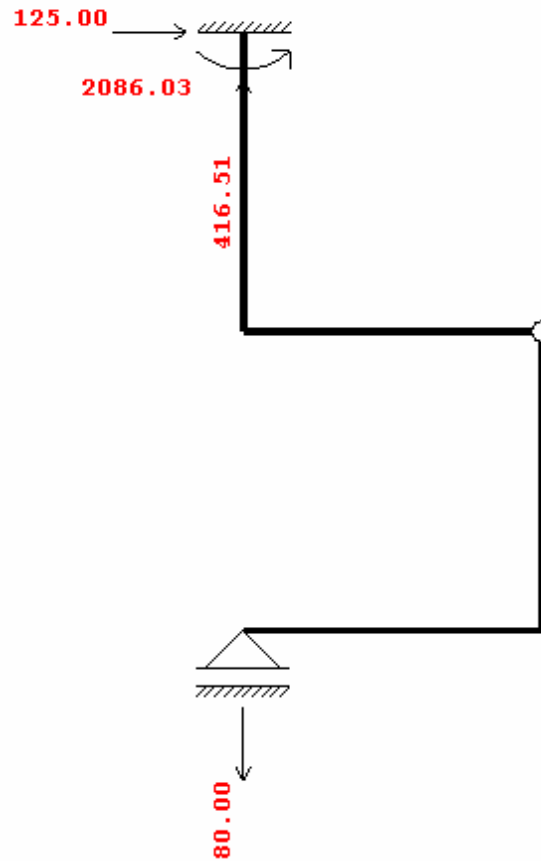
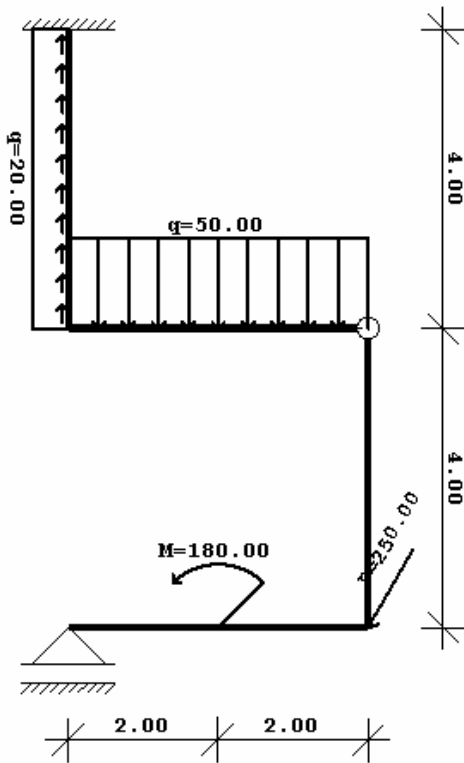
n1



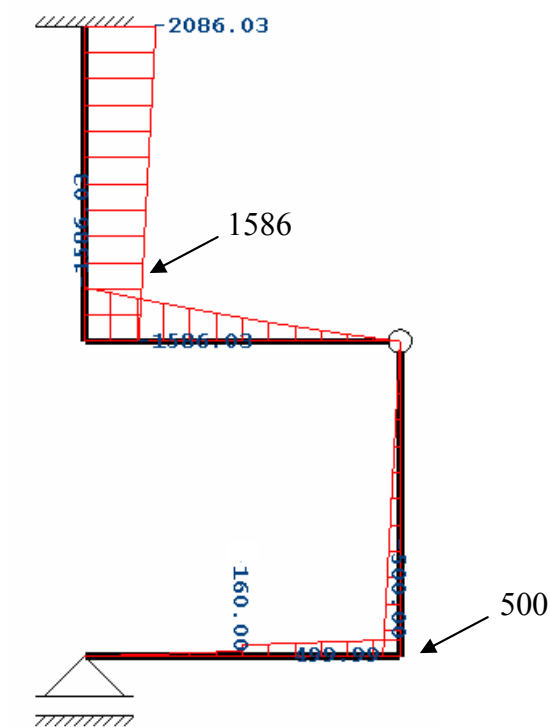
Napomena: dijagram poprečnih sila treba zrcaliti oko uzdužne osi svakog elementa tako da odgovara konvenciji koju smo naučili u Tehničkoj mehanici

VANJSKO OPTEREČENJE

vanjsko opterečenje - reakcije



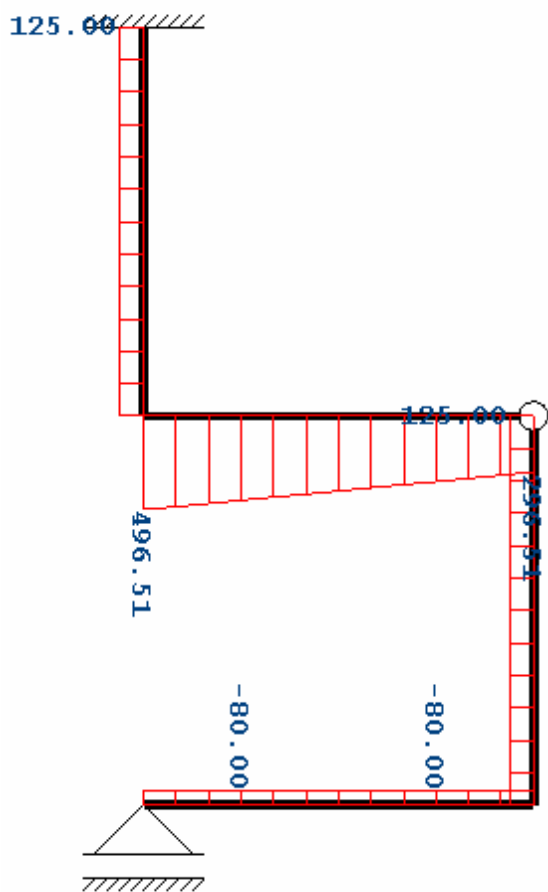
DIJAGRAMI UNUTARNJIH SILA ZA VANJSKO OPTEREČENJE



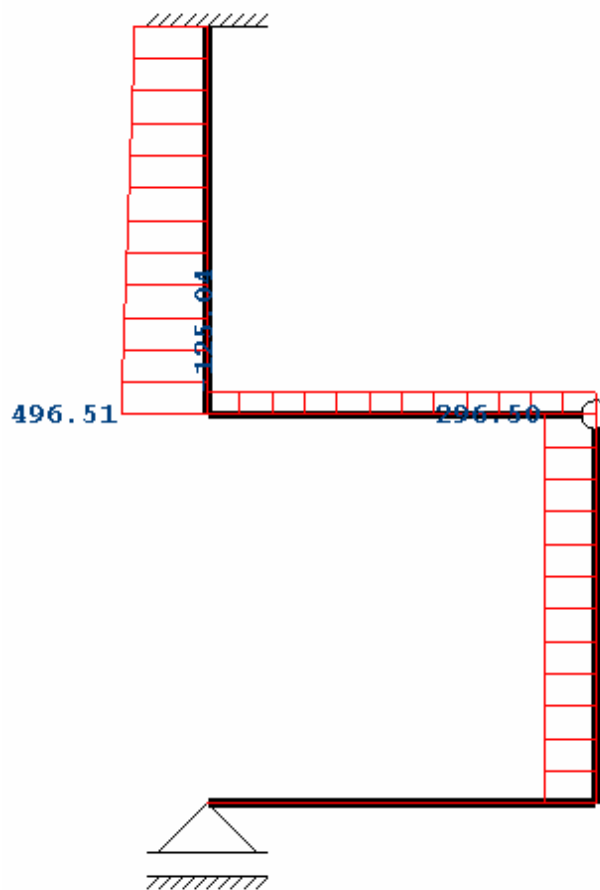
$a_{1v} = -58162.67/EI$

$X_1 = 272.63 \text{ kN}$

Tv



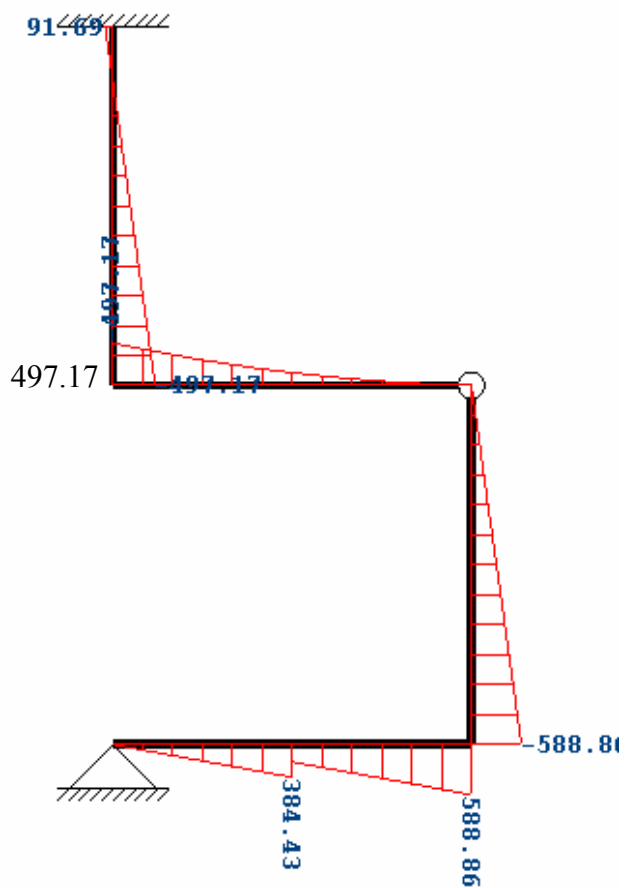
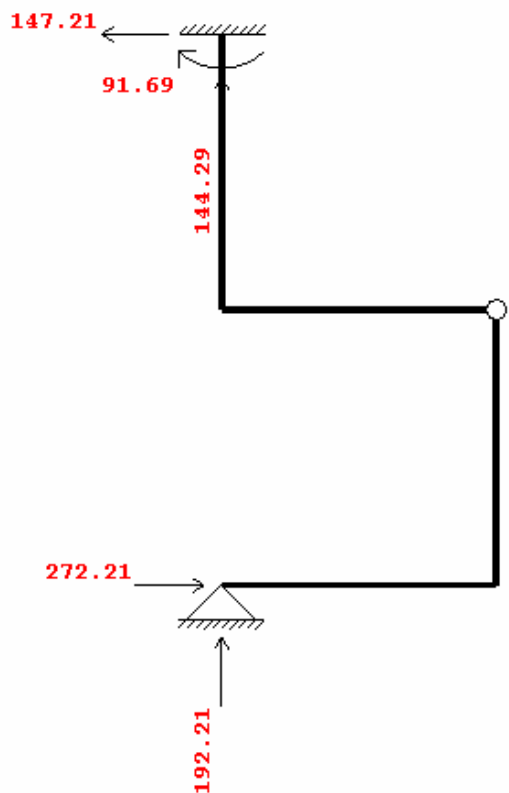
Nv



Napomena: dijagram poprečnih sila treba zrcaliti oko uzdužne osi svakog elementa tako da odgovara konvenciji koju smo naučili u Tehničkoj mehanici

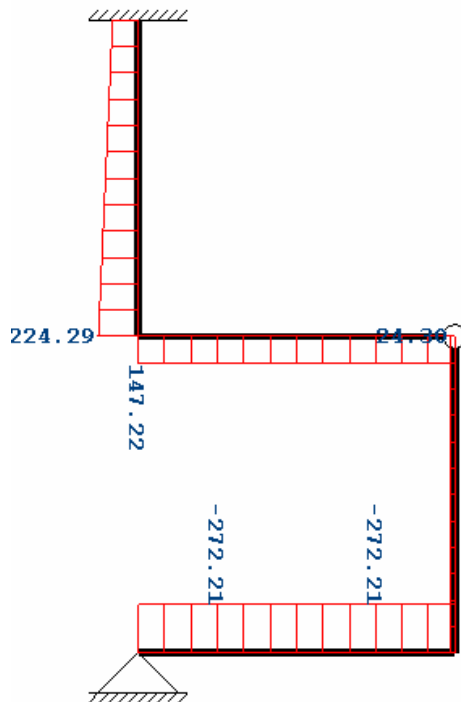
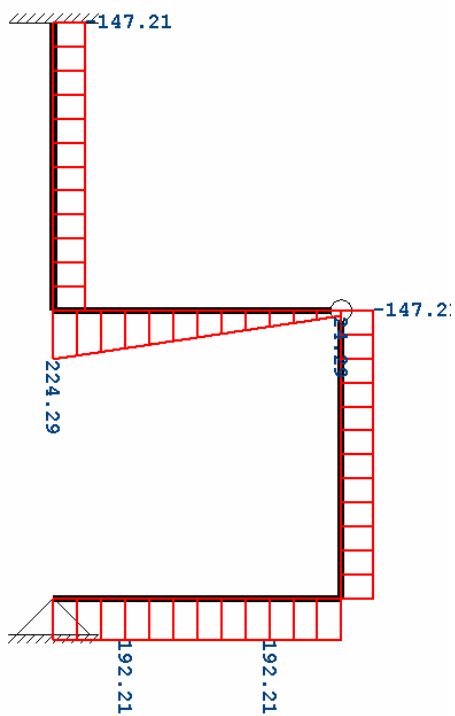
konačne reakcije na zadanom sustavu

KONAČNI DIJAGRAMI UNUTARNJIH SILA



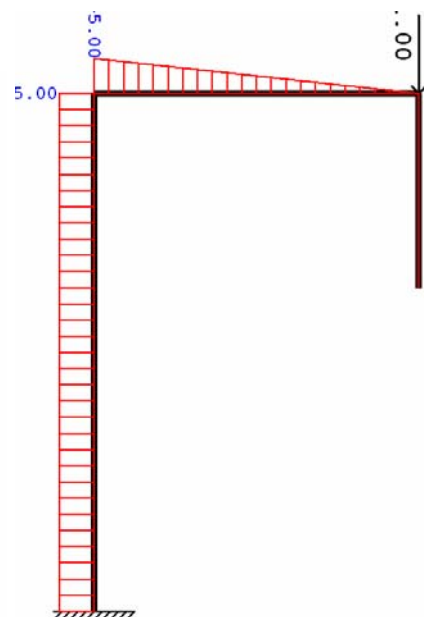
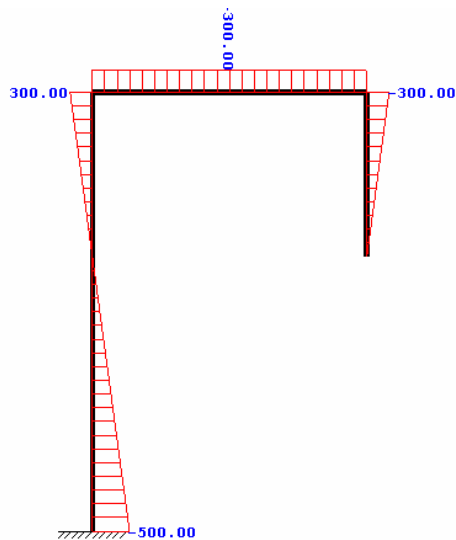
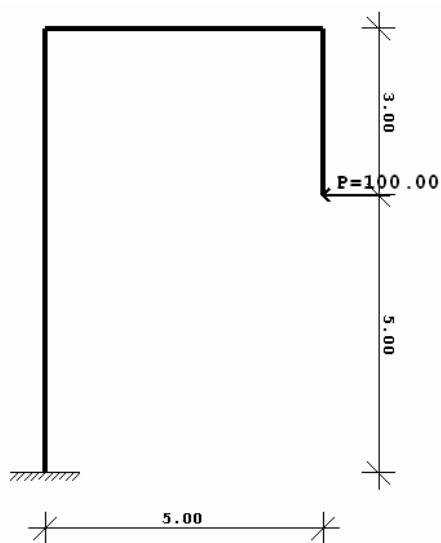
Tk

Nk



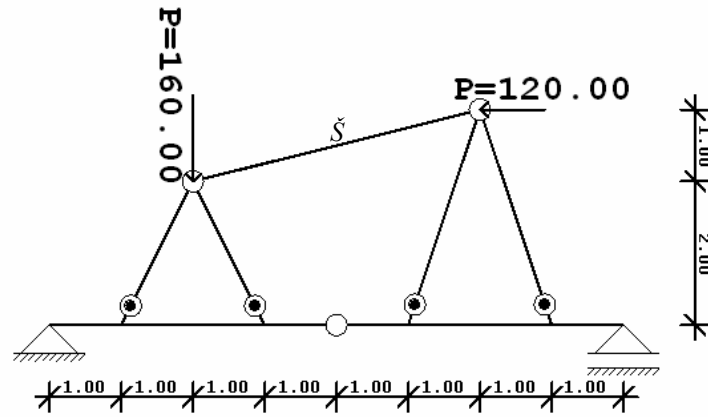
Napomena: dijagram poprečnih sila treba zrcaliti oko uzdužne osi svakog elementa tako da odgovara konvenciji koju smo naučili u Tehničkoj mehanici

3. Odredite vertikalni pomak točke A

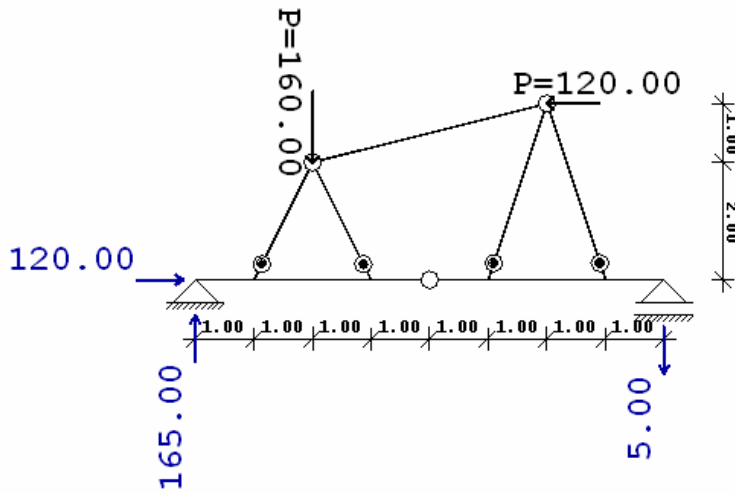


Vertikalni pomak točke A = - 0,0176 m (pomak prema gore)

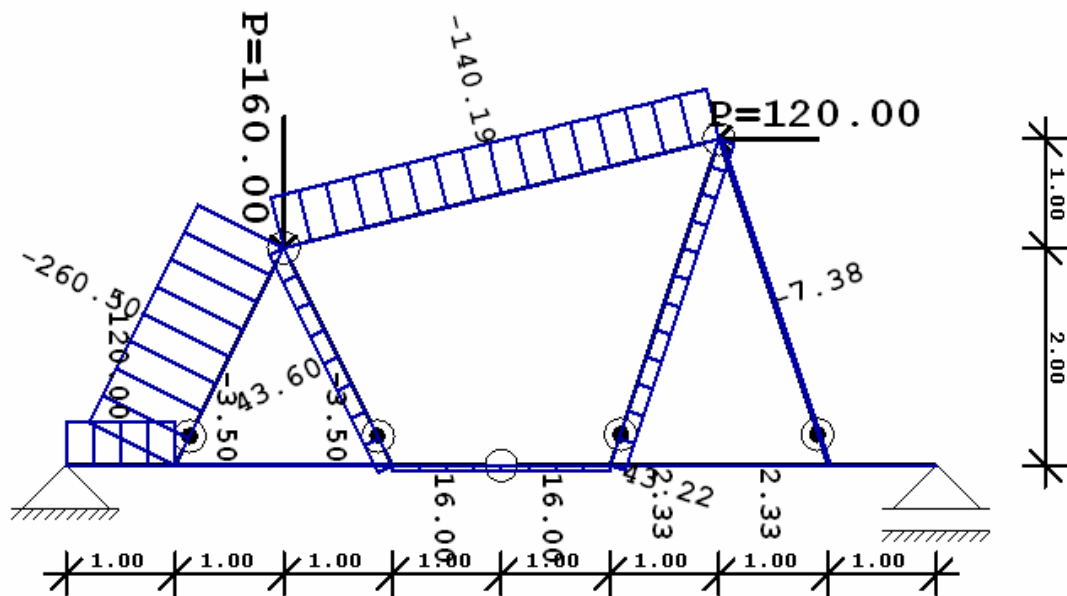
4. Odredite vrijednost sile u označenom štapu ojačane grede



Reakcije



Uzdužne sile



$S_x = -140.2 \text{ kN}$