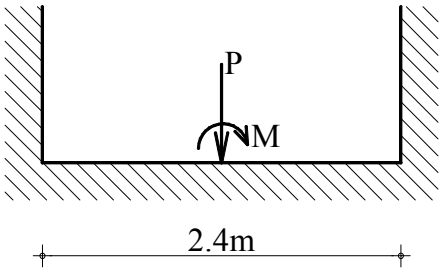
2.5. Izračunaj naprezanje u tlu ispod trakastog temelja širine 2.4m, prikazanog na slici, ako je poznato:
$P = 400\text{kN}/\text{m}'$

$M = 200\text{kNm}/\text{m}'$



$A = 2.4 \cdot 1.0 = 2.4\text{m}^2$

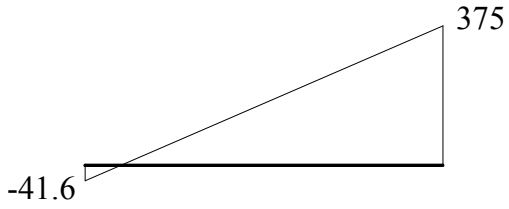
$W = \frac{1 \cdot 2.4^2}{6} = 0.96\text{m}^3$

a)

$$\sigma_{max.min} = \frac{N}{A} \pm \frac{M}{W} = \frac{400\text{kN}}{2.4\text{m}^2} \pm \frac{200\text{kNm}}{0.96\text{m}^3}$$

$$\sigma_{max} = 375\frac{\text{kN}}{\text{m}^2}$$

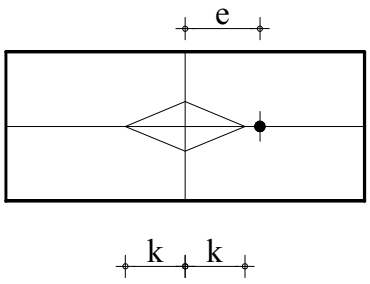
$$\sigma_{min} = -41.6\frac{\text{kN}}{\text{m}^2}$$



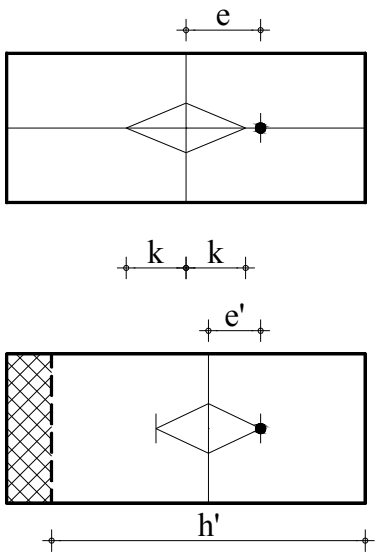
b)

$k = \frac{2.4}{6} = 0.4\text{m}$

$e = \frac{M}{N} = \frac{200\text{kNm}}{400\text{kN}} = 0.5\text{m}$



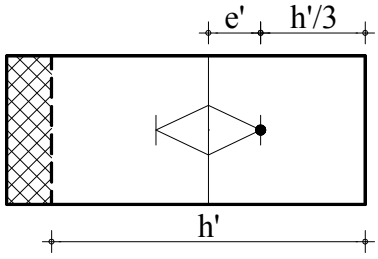
Primjećujemo da je sila izvan jezgre, te je potrebno odrediti reduciranu površinu temelja. Reducirana površina temelja mora imati uvjet da rezultantna sila "pada" na rub jezgre.



Reducirana površina temelja ima širinu h', takvu da ekscentricitet s obzirom na težište reduciranog presjeka odgovara odsječku jezgre.

$$e' = k' = \frac{h'}{6}$$

Pa dobivamo:



$$\frac{h'}{3} = \frac{h}{2} - e$$

$$h' = 3(\frac{h}{2} - e) = 3(1.2 - 0.5) = 2.1\text{m}$$

Sada možemo odrediti stanje naprezanja u temelju, koristeći jezgru dobivamo:

$$\sigma_{max,min} = \frac{P}{A'}(1 \pm \frac{e'}{k'}) = \frac{P}{A'}(1 \pm 1)$$

$$\sigma_{max} = 2\frac{P}{A'} = 2\frac{400\text{kN}}{2.1 \cdot 1\text{m}^2} = 381\frac{\text{kN}}{\text{m}^2}$$

$$\sigma_{min} = 0$$