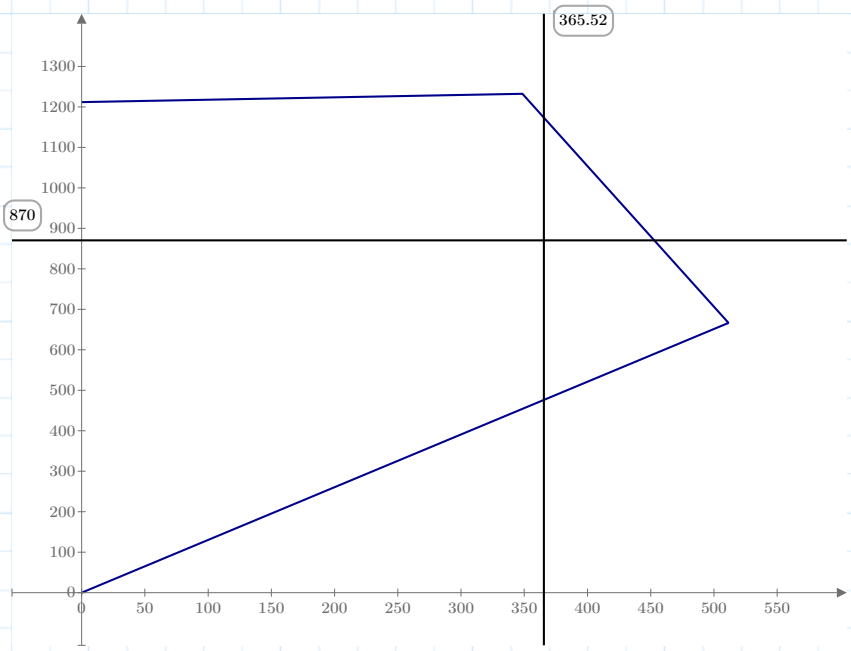
$$\phi M_n := \begin{bmatrix} \phi M_{nA} \\ \phi M_{nB} \\ \phi M_{nC} \\ 0 \end{bmatrix} \qquad \phi P_n := \begin{bmatrix} \phi P_{nA} \\ \phi P_{nB} \\ \phi P_{nC} \\ 0 \end{bmatrix}$$

$$\phi M_n = \begin{bmatrix} 0 \\ 348 \\ 512 \\ 0 \end{bmatrix} \qquad \phi P_n = \begin{bmatrix} 1212 \\ 1232 \\ 666 \\ 0 \end{bmatrix}$$



ϕP_n

ϕM_n

$P_s := P_{DL} + P_{LL}$ $\qquad P_s = 655$

$M_s := M_{DL} + M_{LL}$ $\qquad M_s = 275.2$

$n := \frac{E_s}{E_c}$ $\qquad n = 8.788$

Guess $\quad c := 6.7425$

$C_c := h \cdot c \cdot \frac{c}{2}$ $\qquad C_c = 795.573$

$C_s := (n-1) \cdot A_{s4} \cdot (c - c_{cover})$ $\qquad C_s = 91.521$

$$T := (n-1)\cdot A_{s1}\cdot(d-c) \qquad T = 232.065$$

$$Check \qquad (C_c + C_s) - T - P_s = 0.029$$

Li#qrw#htxdo#wr#}hur#dgmxvw#F#dqg#Fkhfn#djdlq

$$I_{cr} := \frac{h\cdot c^3}{12} + b\cdot c\cdot\left(\frac{c}{2}\right)^2 + (n-1)\cdot A_{s1}\cdot\left(c - c_{cover}\right)^2 + n\cdot A_{s4}\cdot(d-c)^2 \qquad I_{cr} = 5631.915$$

$$I_g := \frac{(h\cdot b^3)}{12} \qquad I_g = 23333.333$$

$$I_{cr} := \frac{I_{cr}}{I_g} \qquad I_{cr} = 0.241$$

$$Assume \qquad f_c := 2000$$

$$C_c := b\cdot c\cdot\frac{f_c}{2} \qquad C_c = 134850$$

$$x := \frac{c}{3} \qquad x = 2.248$$

$$f_s := \frac{c - c_{cover}}{c}\cdot f_c\cdot(n-1) \qquad f_s = 9800.542$$

$$C'_s := A_{s1}\cdot f_s \qquad C'_s = 27147.5$$

$$x_{bar} := \frac{(C'_s\cdot c_{cover} + C_c\cdot x)}{C'_s + C_c} \qquad x_{bar} = 2.29$$

$$jd := d - x_{bar} \qquad jd = 15.21$$

$$T := \frac{M_s\cdot 12000}{jd} \qquad T = 217117.659$$

$$f'_s := T\cdot\left(\frac{f_s}{C_c + C'_s}\right) \qquad f'_s = 13135.207$$

$$\varepsilon'_s := \frac{f'_s}{E_s\cdot 1000} \qquad \varepsilon'_s = 0.0005$$

$$\varepsilon_c := \varepsilon'_s\cdot\left(\frac{c}{c - c_{cover}}\right) \qquad \varepsilon_c = 0.0007$$

if $0 \le \varepsilon_c \le \varepsilon'_t$

$$f_c := \begin{cases} \text{if } 0 \le \varepsilon_c \le \varepsilon'_t \\ \quad 0.85 \cdot \left(E_c \cdot \varepsilon_c - \dfrac{\left(E_c - E_2\right)^2}{4 \cdot f'_c} \cdot \varepsilon_c^{\,2} \right) \\ \text{else} \\ \quad 0.85 \cdot \left(f'_c + E_2 \cdot \varepsilon_c \right) \end{cases}$$

$f_c = 1.658$

$0.65 \cdot f'_c = 2.145$

$f_c \le 0.65 \cdot f'_c$ RN