

São dados:

$b = \dots\dots\dots \text{cm}$
 $h = \dots\dots\dots \text{cm}$
 $d' = \dots\dots\dots \text{cm}$
 $f_{ck} = \dots\dots\dots \text{kN/cm}^2$
 $\gamma_c = \dots\dots\dots$
 $f_{yk} = \dots\dots\dots \text{kN/cm}^2$
 $\gamma_s = \dots\dots\dots$
 $E_s = \dots\dots\dots \text{kN/cm}^2$
 $M = \dots\dots\dots \text{kN} \cdot \text{cm}$
 $\gamma_f = \dots\dots\dots$

São calculados:

$d = 0,9h$
 $f_{cd} = \frac{f_{ck}}{\gamma_c}$
 $f_{yd} = \frac{f_{yk}}{\gamma_s}$
 $M_d = M \times \gamma_f$

$$\epsilon_{yd} = \frac{f_{yd}}{E_s}$$

$$x_{23} = \frac{0,0035}{0,0135} d$$

$$x_{34} = \frac{0,0035}{\epsilon_{yd} + 0,010} d$$

Cálculo da armadura dupla:

- $x = \frac{d}{2}$
- $\bar{M}_d = 0,68 b \times f_{cd} (d - 0,4x)$
- $R_{sd1} = \frac{\bar{M}_d}{d - 0,4x}$
- $A_{s1} = \frac{R_{sd1}}{f_{yd}}$
- $\Delta M_d = M_d - \bar{M}_d$
- $R'_{sd} = R_{sd2} = \frac{\Delta M_d}{d - d'}$
- $A_{s2} = \frac{R_{sd2}}{f_{yd}}$
- Se $x < x_{23}$ então $\epsilon_c = \frac{0,010x}{d - x}$ senão $\epsilon_c = 0,0035$
- $\epsilon'_s = \epsilon_c \frac{x - d'}{x}$ Se $\epsilon'_s < \epsilon_{yd}$ então $\sigma'_{sd} = E_s \epsilon'_s$ senão $\sigma'_{sd} = f_{yd}$
- $A'_s = \frac{R'_{sd}}{\sigma'_{sd}}$ e $A_s = A_{s1} + A_{s2}$

Dados (kN e cm):

Aço	
$f_{yk} =$	50 kN/cm ²
$\gamma_s =$	1,15
$E_s =$	20000 kN/cm ²
Concreto	
$f_{ck} =$	2 kN/cm ²
$\gamma_c =$	1,4
seção	
$b =$	12 cm
$h =$	40 cm
$d' =$	5 cm
Carregamento	
$M =$	10000 kN.cm
$\gamma_f =$	1,4

Calculados:

$f_{yd} =$	43,48 kN/cm ²
$\epsilon_{yd} =$	0,0021739
$f_{cd} =$	1,429 kN/cm ²
$d =$	36,00 cm
$M_d =$	14000,00 kN.cm
Domínios:	
$x_{23} =$	9,33 cm
$x_{34} =$	22,21 cm

Cálculo da armadura dupla:

$x =$	18,00 cm
$M_d =$	6043,1 kN.cm
$R_{sd1} =$	209,8 kN
$A_{s1} =$	4,826 cm ²
$\Delta M_d =$	7956,9 kN.cm
$R'_{sd} = R_{sd2} =$	256,7 kN
$A_{s2} =$	5,904 cm ²
$\epsilon_c =$	0,00350
$\epsilon'_s =$	0,00253
$\sigma'_{sd} =$	43,48 kN/cm ²
$A'_s =$	5,904 cm ²
$A_s =$	10,730 cm ²