

$$\Omega_S = \{S \in R^6 : S = \sum_{l \in L} \alpha_l S_l, \sum_{l \in L} \alpha_l = 1, \alpha_l \geq 0, l \in L\}, \quad (1)$$

$$S_l = \begin{pmatrix} l_0 \\ \vdots \\ l_l \\ \vdots \\ l_6 \end{pmatrix}, \quad l \in L; L \text{ ó } \{1, \dots, 6\}$$

$$S = 0, \quad \text{ö} \quad \text{ö} \quad f_{sy}$$

$$\begin{pmatrix} \sigma_x & \tau_{xy} & \tau_{xz} \end{pmatrix}; \quad \begin{pmatrix} \sigma_y & \sigma_z & \tau_{yz} \\ \sigma_x & \tau_{xy} & \tau_{xz} \end{pmatrix}; \quad \begin{pmatrix} \sigma_x \\ \tau_{xy} \\ \tau_{xz} \end{pmatrix}; \quad \begin{pmatrix} \sigma_x \\ \tau_{xy} \\ \tau_{xz} \end{pmatrix}$$

$$\sigma = \sigma_e(S) + \sigma_r; x \in A_{c,c} \quad (2)$$

$$(\sigma_r = 0), \quad \sigma = \sigma_e(S), x \in A_{c,r} \quad (3)$$

$$\tau_{r,xy} = \tau_{r,xz} = 0. \quad (4)$$

$$(\sigma_e = 0).$$

$$\sigma^2_1 + \sigma^2_2 + \sigma^2_3 \text{ ó } (\sigma_1 \sigma_2 + \sigma_2 \sigma_3 + \sigma_3 \sigma_1) + (f_{c,c} \text{ ó } f_{c,t}) (\sigma_1 + \sigma_2 + \sigma_3) - f_{c,c} f_{c,t} \leq 0, x \in A_c \quad (5)$$

$$\sigma^2 + 3((\tau_{xy})^2 + (\tau_{xz})^2) + (f_{c,c} \text{ ó } f_{c,t}) \sigma \text{ ó } f_{c,c} f_{c,t} \leq 0, x \in A_c \quad (6)$$

$$(\sigma_r = 0). \quad (6)$$

$$-\sigma_e - \sigma_r + R_{c,l} \leq 0, x \in A_{c,c}, \quad (7)$$

$$\sigma_e - R_{t,l} \leq 0, x \in A_{c,t}, \quad (8)$$

$$R_{c,l} \text{ ó } R_{t,l} \text{ ó } \quad (6),$$

$$R_{c,l} = (f_{c,t} - f_{c,c} \text{ ó } D_l)/2, \quad (9)$$

$$R_{t,l} = (f_{c,t} - f_{c,c} + D_l)/2, \quad (10)$$

$$D_l = ((f_{c,t} - f_{c,c})^2 \text{ ó } 12((\tau_{xy,e})^2 + (\tau_{xz,e})^2))^{1/2}; \quad (11)$$

$$(8)$$

$$\sigma_e$$

$$\sigma = \sigma_e(S) + \sigma_r; x \in A_s \quad (12)$$

$$\sigma_e = E \varepsilon,$$

$$-f_{sy} \leq \sigma_s \leq f_{sy}, x \in A_s, \quad (13)$$

$$\sigma_e(S);$$

$$\sigma_e(S), \quad l_0 \quad \sigma_{le}, \sigma_{le+}$$

$$\sigma_e = \min_{l \in L} \{ \sigma_e(S_l); 0 \}; \sigma_{e+} = \max_{l \in L} \{ \sigma_e(S_l); 0 \}. \quad (14)$$

$$C \quad (9) \text{ ó } (11), (14) \quad (7)$$

$$(8) \quad (13) \quad (8)$$

$$\min_{l \in L} (R_{c,l} - \sigma_e(S_l)) - \sigma_{c,r} \leq 0, x \in A_{c,c}, \quad (15)$$

$$\min_{l \in L} (\sigma_e(S_l) - R_{t,l}) \leq 0, x \in A_{c,t}, \quad (16)$$

$$\sigma_e - f_{sy} - \sigma_{s,r} \leq 0, x \in A_{s,c}, \quad (17)$$

$$\sigma_{e+} - f_{sy} + \sigma_{s,r} \leq 0, x \in A_{s,t}, \quad (18)$$

$$\sigma_c^r \quad \sigma_s^r$$

$$\int_{A_c^e} \sigma_{c,r} dA + \int_{A_s} \sigma_{s,r} dA = 0, \quad (19)$$

$$\int_{A_c^e} \sigma_{c,r} y dA + \int_{A_s} \sigma_{s,r} y dA = 0, \quad (20)$$

$$\int_{A_c^e} \sigma_{c,r} z dA + \int_{A_s} \sigma_{s,r} z dA = 0, \quad (21)$$

$$(13)$$

$$A_s,$$

$$(14),$$

$$\sigma_{s,e+} - \sigma_{s,e} - 2 f_{sy} \leq 0. \quad (22)$$

$$\sigma_{s,r}(x), x \in A_s, \quad (17), (18), (22) \quad (15)$$

$$(17), (18), (22)$$

$$(10^5),$$

$$f_{c,c} \text{ ó } f_{c,t}$$

$$N$$

$$10].$$

$$3.$$

$$S_l = S_{ol} + F_o S_{vl}, l \in L. \quad (23)$$

(_____):

$$(15) \text{ ó } (22), \quad F_o \rightarrow \max \quad F_o.$$

$$\overline{f_{c,c}}, \overline{f_{c,y}}, \overline{f_{c,xy}} = \lambda(\overline{f_{c,c}}, \overline{f_{c,y}}, \overline{f_{c,xy}}), \quad (25)$$

(_____):

$$(15)-(22). \quad \rightarrow \min, \quad (26)$$

[3]

1. 4.

$$\Delta A_i, i \in I, \quad A \supseteq A_c \cup A_s$$

(_____ σ_r) |I|

[11].

2.

[7].

$$A_t \quad A_c. \quad (15), (17)$$

(18) $(N, M_y, M_z)_l$

S_l

$$\sigma_r. \quad (19) \text{ ó } (21),$$

$$(N, M_y, M_z)_l \quad (22).$$

S_r

1. F_o (_____).

(22).

3. 4.

5. (15), (17), (18),

σ_r

6. σ_r (19) - (21)

7.

ó

8. 4-7,

9. F_o . 2.

1.

(22).

2.

(24)

3í 8.

9.

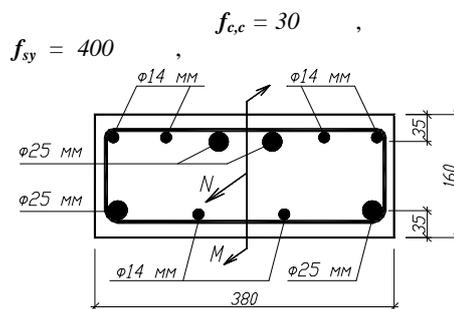
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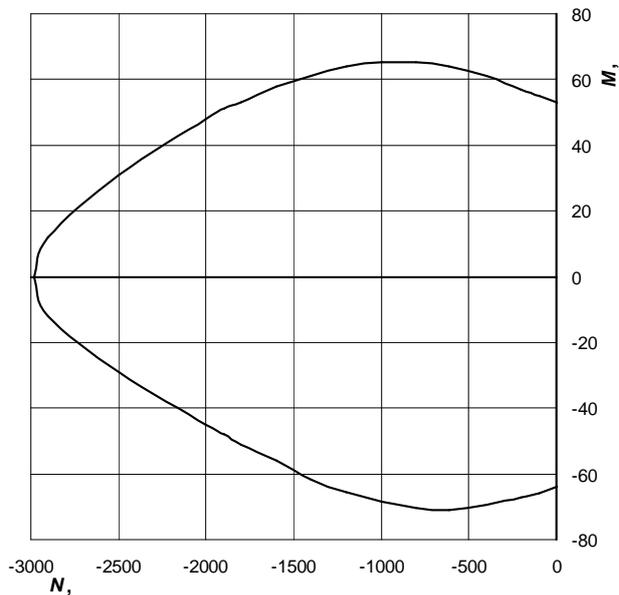
1.

(. 2).



. 2.

(_____)



. 3.

($N \leq 0$)

$$E_c = 20 \cdot 10^3 \quad E_s = 200 \cdot 10^3$$

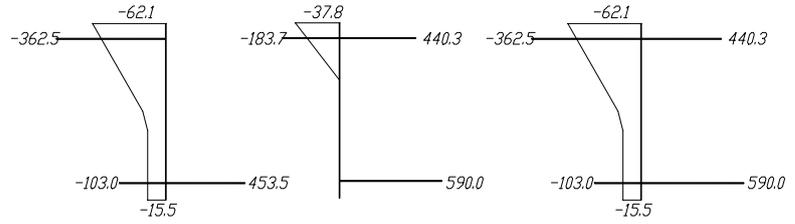
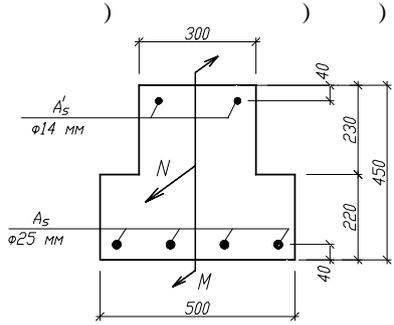
N . 3

S_{vl}

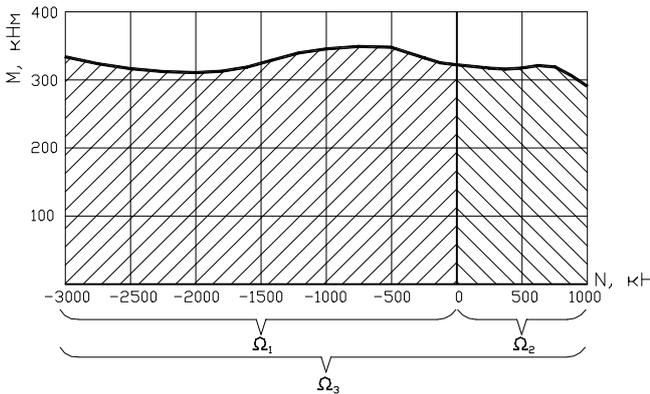
S_l

S_{ol}

$F_o = 0.89.$



. 4. ; , , ó



. 5. M : N ó

11 %.

. 4. ,

$E_s = 200 \cdot 10^3$ $E_c = 30 \cdot 10^3$

M N. 1, 2 3, . 5. . 4. , ,

3 450 30

32 %, 26 % 44 % 1, 2 3

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