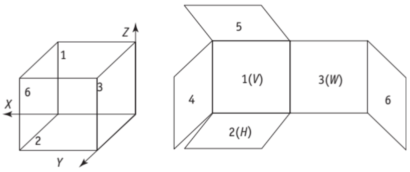
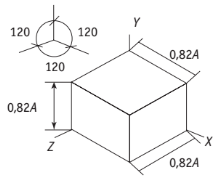
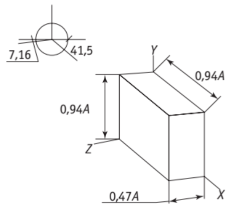
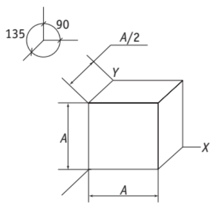
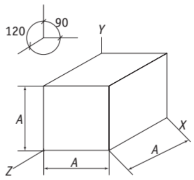
СПРАВОЧНЫЙ МАТЕРИАЛ

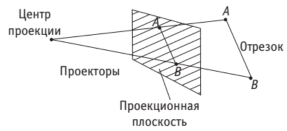


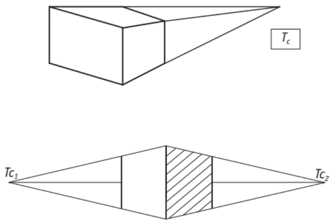


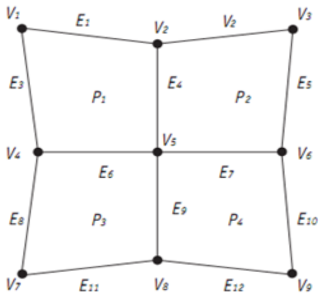


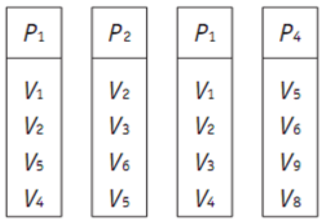


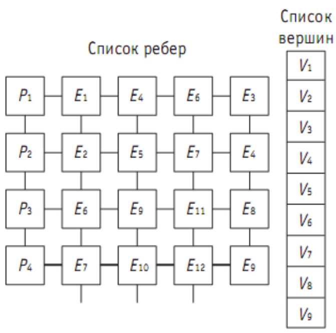


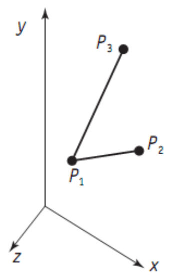




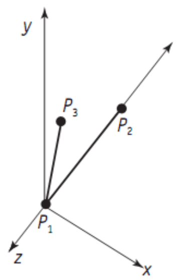








а



б

$$V^* = V \cdot A, \quad V = \begin{pmatrix} x_1 & y_1 & z_1 & 1 \\ \cdots & \cdots & \cdots & \cdots \\ x_n & y_n & z_n & 1 \end{pmatrix} \quad A(R_x, R_y, R_z, D, T, M_x, M_y, M_z)$$

$$[T] = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ \lambda & \mu & \nu & 1 \end{bmatrix} [M_x] = \begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} [D] = \begin{bmatrix} \alpha & 0 & 0 & 0 \\ 0 & \beta & 0 & 0 \\ 0 & 0 & \gamma & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} [R_x] = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos\varphi & \sin\varphi & 0 \\ 0 & -\sin\varphi & \cos\varphi & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$r(t) = \frac{(1-t)^3}{6}V_0 + \frac{3t^3 - 6t^2 + 4}{6}V_1 + \frac{-3t^3 + 3t^2 + 3t + 1}{6}V_2 + \frac{t^3}{6}V_3$$

для $0 \le t \le 1$,

$$r = r_i(t) = \begin{pmatrix} V_{i-1} & V_i & V_{i+1} & V_{i+2} \end{pmatrix} M \begin{pmatrix} 1 \\ t-i+1 \\ (t-i+1)^2 \\ (t-i+1)^3 \end{pmatrix}$$

где: $(I - 1) \le t \le i$, $I = 1, \ldots, (m - 2)$

$$r(t) = \frac{\sum_{i=0}^{3} w_i n_i(t) V_i}{\sum_{i=0}^{3} w_i n_i(t)} \qquad 0 \le t \le 1$$

где $n_0(t) = \frac{(1-t)^3}{6}$, $n_1(t) = \frac{3t^3 - 6t^2 + 4}{6}$, $n_2(t) = \frac{-3t^3 + 3t^2 + 3t + 1}{6}$, $n_3(t) = \frac{t^3}{6}$

r(t)=V M T, $0 \le t \le 1$, где

$$r(t) = \begin{pmatrix} x(t) \\ y(t) \\ z(t) \end{pmatrix} \qquad V = (V_{i-1} V_i V_{i+1} V_{i+2}) = \begin{pmatrix} x_0 & x_1 & x_2 & x_3 \\ y_0 & y_1 & y_2 & y_3 \\ z_0 & z_1 & z_2 & z_3 \end{pmatrix} \qquad T = \begin{pmatrix} 1 \\ t \\ t^2 \\ t^3 \end{pmatrix}$$

$$M = \frac{1}{\delta} \begin{pmatrix} 2\alpha & -6\alpha & 6\alpha & -2\alpha \\ 4(\beta_1^2 + \beta_1) + \beta_2 & 6(\alpha - \beta_1) & -3(2\alpha + \mu) & 2(\alpha + \nu) \\ 2 & 6\beta_1 & 3\mu & -2(\nu + 1) \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Где

$\alpha = \beta_1^3$, $\mu = 2\beta_1^2 + \beta_2$, $\nu = \beta_1^2 + \beta_1 + \beta_2$, $\delta = 2\beta_1^3 + 4\beta_1^2 + 4\beta_1 + \beta_2 + 2$

$$a \le \xi \le b$$

$$\omega = \{x_i : x_0 = a < x_1 < \cdots < x_i < \cdots < x_n = b\}$$

$$y(x_0) = y_0, \ldots, y(x_i) = y_i, \ldots, y(x_n) = y_n$$

$$f(x_i) = y_i, i = 0, 1, \ldots, n.$$

$$f(x) = \sum_{k=0}^{N} c_k \Phi_k(x), \qquad \sum_{k=0}^{N} c_k \Phi_k(x_i) = y_i, i = 0, 1, \ldots, n.$$

$$r(u,v) = \sum_{i=0}^{m}\sum_{j=0}^{n} a_i(u)\, b_j(v)\, V_{ij}$$

$$r(u, v) = \sum_{i=0}^{3}\sum_{j=0}^{3} c_3^j c_3^i\, u^i(1-u)^{3-i}\, v^j(1-v)^{3-j}\, V_{ij}$$

где:

$0 \le u \le 1;\ 0 \le v \le 1$

$P_1^{(1)}$ – середина отрезка $P_0 P_1$;

$P_2^{(1)}$ – середина отрезка $P_1 P_2$;

$P_2^{(2)}$ – середина отрезка $P_1^{(1)} P_2^{(1)}$.

$P_1^{(1)}(t) = t\,P_1 + (1-t)P_0;$

$P_2^{(1)}(t) = t\,P_2 + (1-t)P_1;$

$P_3^{(1)}(t) = t\,P_3 + (1-t)P_2;$

$P_2^{(2)}(t) = t\,P_2^{(1)}(t) + (1-t)P_1^{(1)}(t);$

$P_3^{(2)}(t) = t\,P_3^{(1)}(t) + (1-t)P_2^{(1)}(t);$

$P_3^{(3)}(t) = t\,P_3^{(2)}(t) + (1-t)P_2^{(2)}(t).$

Обозначим $P_3^{(3)}(t)$ как $P(t)$.

$$p(u,v) = \sum_{i=0}^{m}\sum_{j=0}^{n} N_{i,m}(u)\cdot N_{j,n}(v)\cdot P_{i,j}$$

$$S(u,v) = \frac{\sum_{i=0}^{m}\sum_{j=0}^{n} N_{i,p}(u)\cdot N_{i,q}(v)\cdot w_{i,j}P_{i,j}}{\sum_{i=0}^{m}\sum_{j=0}^{n} N_{i,p}(u)\cdot N_{i,q}(v)\cdot w_{i,j}}$$

$$r(u,v) = \frac{U * M\left[w_{ij}P_{ij}\right] * M^T * V}{U * M\left[w_{ij}\right] * M^T * V}$$

$$M\left[w_{ij}P_{ij}\right] = \begin{bmatrix} w_{00}P_{00} & \cdots & w_{0n}P_{0n} \\ \vdots & \ddots & \vdots \\ w_{0m}P_{m0} & \cdots & w_{mn}P_{mn} \end{bmatrix}$$

$$m_{ij} = (-1)^{j-1}\frac{(n)}{(j)}\frac{(i)}{(j)}$$

$v = const$

$0 \le (v = const) \le 1$

$0 \le u \le 1$

$$r(u,v) = \frac{\sum_{i=0}^{m} w_i B_i^m(u) P_i}{\sum_{i=0}^{m} w_i B_i^m(u)}$$

$u = const$

$0 \le (u = const) \le 1$

$0 \le u \le 1$

$$r(u,v) = \frac{\sum_{j=0}^{n} w_j B_j^n(v) P_j}{\sum_{j=0}^{n} w_j B_j^n(u)}$$

$$r(u,v) = \frac{\sum_{i=0}^{m} w_i B_i^m(u) P_i}{\sum_{i=0}^{m} w_i B_i^m(u)} + \frac{\sum_{j=0}^{n} w_j B_j^n(v) P_j}{\sum_{j=0}^{n} w_j B_j^n(u)} - \frac{\sum_{i=0}^{m}\sum_{j=0}^{n} w_{ij} B_i^m(u) B_j^n(v) P_{ij}}{\sum_{i=0}^{m}\sum_{j=0}^{n} w_{ij} B_i^m(u) B_j^n(v)}$$