10-3.   .

1.   .

1.1

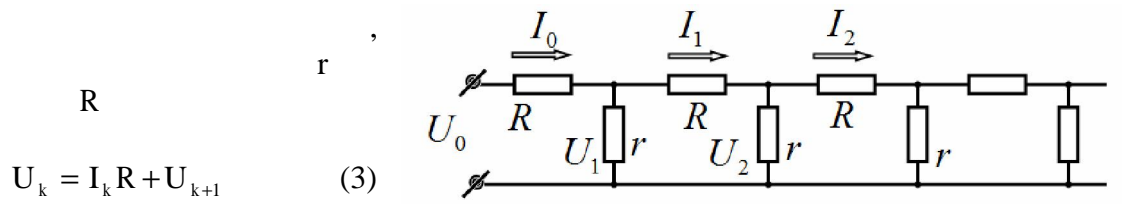$$R = \rho_0 \frac{L}{S} = \rho_0 \frac{4L}{\pi d^2} = 0,87 \qquad . \tag{1}$$

1.2   ,

,

$$r = \rho_1 \frac{h}{2\pi dL} = 6,7 \cdot 10^6 \qquad . \tag{2}$$

2.   .

2.1

,   ,

r

R

$$U_k = I_k R + U_{k+1} \qquad (3)$$

,

$$I_k = \frac{U_k - U_{k+1}}{R} \tag{4}$$

2.2   ,   ,

$$I_{k-1} = I_k + \frac{U_k}{r}. \tag{5}$$

$\frac{U_k}{r}$ -   .

(4)   (5),

$$\frac{U_{k-1} - U_k}{R} = \frac{U_k}{r} + \frac{U_k - U_{k+1}}{R}. \tag{6}$$

$$U_{k-1} - \left(2 + \frac{R}{r}\right)U_k + U_{k+1} = 0. \tag{7}$$

2.3   ,

$$U_k = U_0 \lambda^k \qquad (7):$$

$$U_0 \lambda^{k-1} - \left(2 + \frac{R}{r}\right)U_0 \lambda^k + U_0 \lambda^{k+1} = 0. \tag{8}$$

,

$$\lambda^2 - \left(2 + \frac{R}{r}\right)\lambda + 1 = 0. \tag{9}$$

,   ,

λ (9).

X   .   .   1.   7

.   .

$$\lambda_{1,2} = 1 + \frac{R}{2r} \pm \sqrt{\left(1 + \frac{R}{2r}\right)^2 - 1} \qquad (10)$$

«   »,

1.   ,
                                                              .

λ $\lambda = 1 - \varepsilon$, $\varepsilon = 3,6 \cdot 10^{-4}$.

«   »   :   ,

(10) 10^{-8},

10^{-8}.

:

$$\lambda = 1 + \frac{R}{2r} - \sqrt{\left(1 + \frac{R}{2r}\right)^2 - 1} = 1 + \frac{R}{2r} - \sqrt{\frac{R}{r} + \left(\frac{R}{2r}\right)^2} \approx 1 - \sqrt{\frac{R}{r}}$$

,   ,   0,5.
,

(10)

2.4   1   ,
2000   N = 2000   .

        ,   ,

$$\frac{U_{2000}}{U_0} = (1 - \varepsilon)^N \approx 0,5 \qquad (11)$$

.   2   .   .

        ,   10

,

.

,   ,   0,5.

,   (10)

2.5   1   ,
2000   N = 2000   .

        ,   ,

$$\frac{U_{2000}}{U_0} = (1 - \varepsilon)^N \approx 0,5 \qquad (11)$$

.   2   .   .

        ,   10

,

.

X   .   .   1.   8
                          .   .