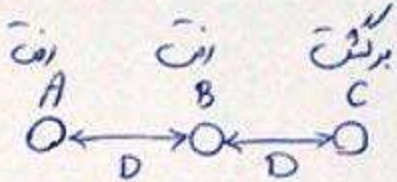
تحلیل سیستم های انرژی الکتریکی I

(۸۶



$\rightarrow$ if $L = 10^{-7}\left(\ln 4 + 3\ln\frac{4}{2}\right) \rightarrow D = ?$

$$L = L_{\text{رفت}} + L_{\text{برگشت}} = 2\times10^{-7}\left[\ln\frac{\sqrt{2D^2}}{\sqrt{2'D}} + \ln\frac{\sqrt{2D^2}}{2'}\right] = 10^{-7}\ln\frac{2D^2\cdot 2D^2}{2e^{-1/4}D\cdot 2^2e^{-1/4}}$$

$$= 10^{-7}\ln\left(4\times\frac{D^3}{2^3e^{-3/4}}\right) \rightarrow \frac{D^3}{2^3e^{-3/4}} = \frac{4^3}{2^3} \rightarrow D = 4e^{-1/4}$$

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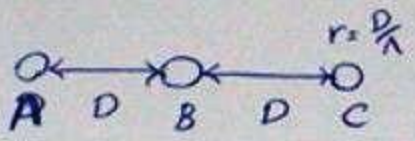
$$Z_{base} = \frac{400^2}{400} = 400\,\Omega \rightarrow X = 10^{-4}\times 400 = 0.04$$

$$\rightarrow \frac{P_{max2}}{P_{max1}} = \frac{X_1}{X_2} = \frac{0.04}{0.04 - X_C} = \frac{8}{7} \rightarrow X_C = \frac{0.04}{8} = \frac{1}{200} = \frac{1}{\omega C} \rightarrow C = \frac{200}{2\pi\times 50} = \frac{2}{\pi}$$

۸۸) در مدل T داریم:

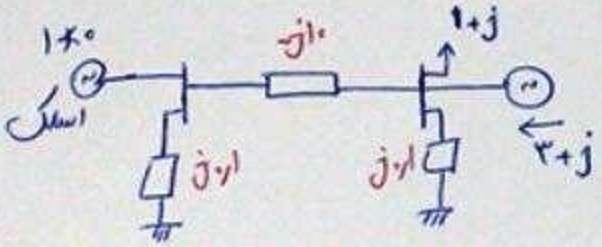


$$T = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \Rightarrow Y = j\omega C$$

خطوط ترانسپوز شده اند.

$$Y = j \times 2\pi \times 50 \times \frac{2\pi\varepsilon_0}{\ln \frac{2\frac{1}{4}D}{\frac{D}{8}}} \cdot \alpha \times 10^3 = j\,\frac{60\pi^2 \alpha\, \varepsilon_0}{\ln 2} \times 10^3$$

۸۹)



$$S_2 = 3 + j - (1 + j) = 2$$

$$Y_{bus} = \begin{bmatrix} -j9.9 & j10 \\ j10 & -j9.9 \end{bmatrix}$$

$$V_2^{(1)} = \frac{1}{-j9.9}\left[\frac{2}{1\angle 0} - (j10 \times 1)\right] = \frac{j}{9.9}(2 - j10) = \frac{10 - j2}{9.9}$$

۹۰)

بار $\begin{cases} \rightarrow 100\,kW,\ \cos\varphi = 0.6\ lag \rightarrow S_1 = 100 + j100 \times \frac{8}{6} \\ \rightarrow 100\,kVA,\ \cos\varphi = 0.4\ lag \rightarrow S_2 = 40 + j80 \end{cases}$

$\cos\varphi_2 = 0.8 \rightarrow Q_C = ?$ $\quad S_{کل} = 140 + j\left(80 + \frac{400}{3}\right)$

$\rightarrow Q_2 = 140 \times \frac{8}{10} = 128 \rightarrow Q_C = \left(80 + \frac{400}{3}\right) - 128 \simeq 85\ kVAr$