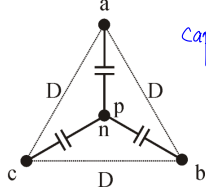


2022/05/31 電力工程導論 姓名_____學號_____

1. (20) Assume that 1. conductors are equally spaced, D, and have equal radii r. 2. $q_a +$

Ex 7.7 & 3.2

$q_b + q_c = 0$ ($c_a = c_b = c_c = c$, $v_a + v_b + v_c = 0$) 3. $i_a + i_b + i_c = 0$. Find (a) $\epsilon = ?$ (b) $\lambda_a = ?$



cap 不会很大

$$\begin{bmatrix} v_a \\ v_b \\ v_c \end{bmatrix} = \begin{bmatrix} \cosh(\gamma l) & Z_c \sinh(\gamma l) \\ Z_c \sinh(\gamma l) & \cosh(\gamma l) \end{bmatrix} \begin{bmatrix} I_a \\ I_b \\ I_c \end{bmatrix} = A \begin{bmatrix} v_a \\ v_b \\ v_c \end{bmatrix}$$

$$\begin{bmatrix} I_a \\ I_b \\ I_c \end{bmatrix} = A^{-1} \begin{bmatrix} v_a \\ v_b \\ v_c \end{bmatrix}$$

$$\omega = 2\pi f, f = 60\text{Hz}$$

$$\omega = 120\pi \text{ rad/s}$$

$$\gamma = (\gamma Z)^{0.5} = \alpha + j\beta$$

3 相

$$V_{LL} = \sqrt{3} V_\phi \angle 30^\circ$$

$$\text{When } x = l, V = V_1, I = I_1 \Rightarrow$$

$$V_1 = V_2 \cosh \gamma l + Z_c I_2 \sinh \gamma l;$$

$$I_1 = I_2 \cosh \gamma l + (V_2 / Z_c) \sinh \gamma l$$

Ex 4.1

2. (20) A 60-Hz 138-kV 3Φ transmission line is 225 mile long. The distributed line parameters are $r = 0.169 \Omega/\text{mile}$, $l = 2.093 \text{ mH}/\text{mile}$, $c = 0.01427 \mu\text{F}/\text{mile}$, $g = 0$. The transmission line delivers 40 Mwat 132 kV with 95% power factor lagging. (a) Find the sending-end voltage and current. (b) Find the transmission line efficiency.

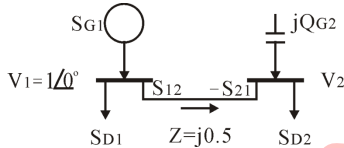
3. (20) $V_1 = 1 \angle 0^\circ$, $jQ_{G2} = j1.0$, $Z_L = j0.5$, $S_{D2} = P_{D2} + j1.0$. Find S_1 and V_2 . We consider

(ref 2.6/2.14)

$$= 1 \angle 90^\circ = j\omega L = j77 \text{ mH/s}$$

Ex 6.3

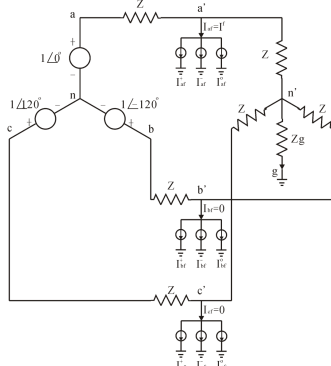
the solution as a function of P_{D2} for $P_{D2} \geq 0$. (a) If $P_{D2} > 1 \Rightarrow V_2 = ?$ (b) If $P_{D2} = 1 \Rightarrow V_2 = ?$ (c) If $P_{D2} = 0.5 \Rightarrow V_2 = ?$



只有 a 有故障

Ex 13.5

4. (20) Fault current: $I^f = [I_{af} \ I_{bf} \ I_{cf}]^T = [I^f \ 0 \ 0]^T$. Find the symmetrical components of single line-to-ground faults currents.



$$\alpha = e^{j120^\circ} = e^{j\frac{2\pi}{3}}$$

$$= \cos 120^\circ + j \sin 120^\circ$$

$\sin(\omega t)$
 $\cos(\omega t)$ 谐波

正序, 负序, 零序

$$\alpha' = e^{j120^\circ} \alpha e^{j120^\circ} = e^{j240^\circ}$$

$$\alpha'' = e^{j120^\circ} = e^{j0^\circ}$$

$$= \cos 0^\circ + j \sin 0^\circ$$

5. (20) $v_a = 180 \cos \omega t$, $v_b = 180 \cos (\omega t - 120^\circ)$, $v_c = 180 \cos (\omega t + 120^\circ)$ (a) Find abc

PPL page 3

Reference Frame to Stationary Reference Frame (b) Stationary Reference Frame to Synchronous Reference Frame

$$(1) \begin{bmatrix} V_{qs} \\ V_{ds} \end{bmatrix} = \begin{bmatrix} \frac{2}{3} & -\frac{1}{3} & -\frac{1}{3} \\ 0 & -\frac{1}{\sqrt{3}} & \frac{1}{\sqrt{3}} \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix}$$

$$(2) \begin{bmatrix} V_{qe} \\ V_{de} \end{bmatrix} = \begin{bmatrix} \cos \omega t & -\sin \omega t \\ \sin \omega t & \cos \omega t \end{bmatrix} \begin{bmatrix} V_{qs} \\ V_{ds} \end{bmatrix}$$

