

[S.63 送 2]

$$\dot{E}_s - \dot{E}_r = \dot{I}_r (r + jX)$$

\dot{E}_r 基準 234V

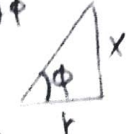
$$E_s e^{j\delta} - E_r = \dot{I}_r (r + jX)$$

$$\dot{I}_r = \frac{E_s e^{j\delta} - E_r}{e^{j\phi} Z}$$

※ 複素電力
合計電流

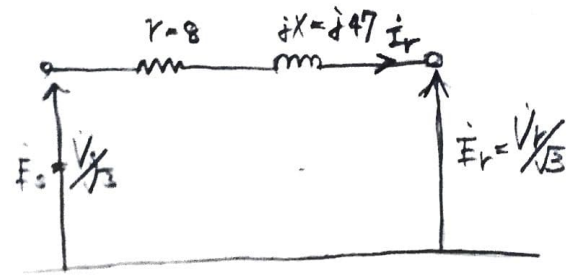
$$Z = \sqrt{r^2 + X^2} e^{j\phi}$$

$$= |Z| e^{j\phi}$$



$$|Z| = \sqrt{8^2 + 47^2}$$

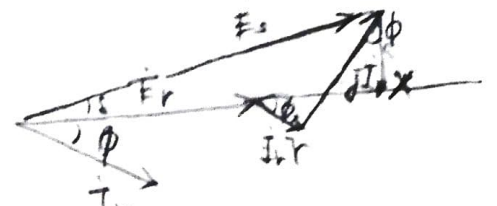
$$= 47.676$$



$$P + jQ = 3 \dot{E}_r \dot{I}_r \quad (\text{Qは+をとり直す})$$

$$= 3 E_r \left(\frac{E_s}{Z} e^{j(\delta-\phi)} - \frac{E_r}{Z} e^{-j\phi} \right)$$

$$= \frac{V_r V_s}{Z} e^{-j(\delta-\phi)} - \frac{V_r^2}{Z} e^{+j\phi} = \frac{V_r V_s}{Z} (\cos(\phi-\delta) + j \sin(\phi-\delta)) - \frac{V_r^2}{Z} (\cos \phi + j \sin \phi)$$



$$P = \frac{V_r V_s}{Z} \cos(\phi-\delta) - \frac{V_r^2}{Z} \cos \phi$$

$$\cos \phi = \frac{r}{|Z|}$$

$$\phi = \tan^{-1} \frac{47}{8} = 80.34^\circ$$

$$Q = \frac{V_r V_s}{Z} \sin(\phi-\delta) - \frac{V_r^2}{Z} \sin \phi$$

$$\sin \phi = \frac{X}{|Z|}$$

$$P = 219.64 \times 10^6 \text{ W}$$

$$219.64 \times 10^6 = \frac{154 \times 10^3 \times 140 \times 10^3}{47.676} \cos(\phi-\delta) - \frac{(140 \times 10^3)^2}{47.676} \times \frac{8}{47.676}$$

$$\cos(\phi-\delta) = \left(219.64 \times 10^6 + \frac{8(140 \times 10^3)^2}{(47.676)^2} \right) \times \frac{47.676}{154 \times 140 \times 10^6} = 0.63824$$

$$\phi - \delta = \cos^{-1} 0.63824$$

$$\delta = \phi - \cos^{-1} 0.63824 = 80.34^\circ - 50.339^\circ = 30.001 \approx 30^\circ$$

$$Q_r = \frac{154 \times 140 \times 10^6}{47.676} \sin(30.339) - \frac{140^2 \times 10^6}{47.676} \frac{47}{47.676} = -57.145 \times 10^6 \text{ (VAR)}$$

$$\approx -57.15 \text{ MVAR}$$

進み.

$$\text{PF} = \frac{P}{\sqrt{P^2 + Q^2}} = \frac{219.64}{\sqrt{219.64^2 + 57.15^2}} = 0.9677 \approx 0.968$$

$$\therefore 96.8\% //$$