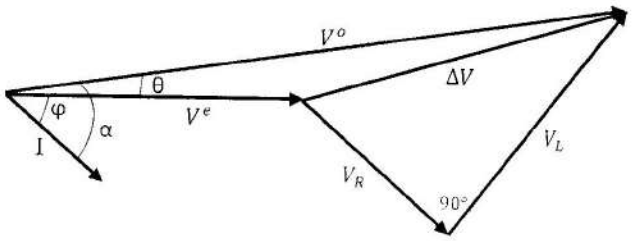
Corrigé EMD RE

Exercice 01: (12 pts)

1- Le diagramme de Fresnel de la ligne :



(02 pts)

2- La tension de départ :

$$\overline{V^o} = \overline{V^e} + \bar{I} \times \bar{Z}$$

$$\overline{V^e} = 33000 \angle 0^\circ$$

$$\bar{I} = I \times (\cos\varphi - \mathrm{j}\sin\varphi)$$

$$I = \frac{P^e}{V \times \cos\varphi} = \frac{1100 \times 10^3}{33000 \times 0.8} = 41.67\ A$$

$$\cos\varphi = 0.8 \ \gg\gg\gg\gg\gg\gg\gg\gg\gg\gg\gg\ \sin\varphi = 0.6$$

$$\bar{I} = 41.67 \times (0.8 - j0.6) = 33.33 - j25$$

$$\bar{I} = A + jB = C \angle \varphi^\circ = C\, e^{+j\theta} \quad avec\ C = \sqrt{A^2 + B^2}\ et\ \varphi = artg\ \frac{B}{A}$$

$$C = \sqrt{A^2 + B^2} = \sqrt{33.33^2 + 25^2} = 41.67$$

$$\varphi = artg\ \frac{B}{A} = artg\ \frac{25}{33.33} = artg\ 0.75 = 36.87$$

$$\bar{I} = 33.33 - j25 = 41.67 \angle 36.87^\circ = 41.67 e^{-j\,36.87}$$

$$\overline{V^o} = \overline{V^e} + \bar{I} \times \bar{Z} = 33000 + (33.33 - j25) \times (10 + j15) = 33708.3 + j249.95$$

$$C = \sqrt{33708.3^2 + 249.95^2} = 33709.22$$

$$\theta = artg \frac{249.95}{33708.3} = artg\ 0.0074 = 0.42^\circ$$

$$\overline{V^o} = 33709.22 \angle 0.42^\circ = 33709.22 e^{+j\,0.42}$$ **(03 pts)**

Le facteur de puissance de départ :

Le facteur de puissance $= \cos \propto$ $\quad avec \ \propto = \varphi + \theta$

$\propto = 36.87 + 0.42 = 37.29°$

$FP = \cos 37.39 = 0.79$ **(03 pts)**

3- Les pertes en ligne :

$\Delta P = R \times I^2 = 10 \times 41.67^2 = 17.364\ kW$ **(01 pts)**

$\Delta Q = X \times I^2 = 15 \times 41.67^2 = 26.046\ kVAR$ **(01 pts)**

Le rendement de la ligne :

$$\eta = \frac{P^e}{P^o} = \frac{P^e}{P^e + \Delta P} = \frac{1100 \times 10^3}{1100 \times 10^3 + 17.364 \times 10^3} = 0.98$$ **(02 pts)**

Exercice 02 : (08 pts)

Question de cours.