PARCIAL #1. CONV2 - 2020-2

GS: 16 kV, 200 MVA, LOSS = 0, $X_S = 2.112\ \Omega$, "Δ"

BUS ∞ = 15 kV.

PROBLEMA #1. $E_g = 20\ kV_{LL}$, $\delta = 27.4°$, $V_\phi = 15\ kV$.

a) $P, Q = ?$

$$E_g \angle \delta = V_\phi \angle 0° + jX_S I_A \angle \phi$$

$$V_{LL} = V_{LN} = V_\phi = 15\ kV$$

$$I_A \angle \phi = \frac{E_g \angle \delta - V_\phi \angle 0°}{jX_S} \Rightarrow I_L = \sqrt{3} I_A \Rightarrow (I_A)$$

$$S_g = \sqrt{3}\, V_L I_L^* = P_g + jQ_g$$

b) $I_A' = I_\phi' = 0.8\, I_A \angle \phi$

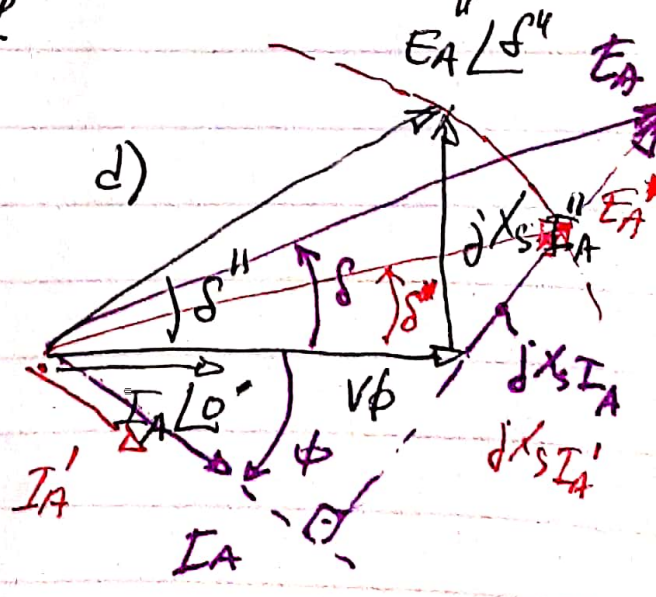
$$E_A' \angle \delta' = V_\phi \angle 0° + jX_S I_A' \angle \phi$$

c) Si $pf = \cos\phi = 1.0$

$$E_A'' \angle \delta'' = V_\phi \angle 0° + jX_S I_A' \angle 0°$$

(a) $pf = 1.0$ $\quad I_A'' = I_A' \angle 0°$

d)



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PROBLEMA #2.

FULL LOAD = 200 MVA

50% = 100 MVA

pf = 0,75 (-)

a) $I_L = \frac{S}{\sqrt{3}\, V_L} = \frac{100 \times 10^3}{\sqrt{3} \times 15}$

$I_\phi = I_A \angle \phi$; $pf = \cos\phi = 0{,}75 \Rightarrow \phi$

$E_A \angle \delta = V_\phi \angle 0^\circ + j X_S I_A \angle \phi$; $V_\phi = 15\,kV$

b) P = constante

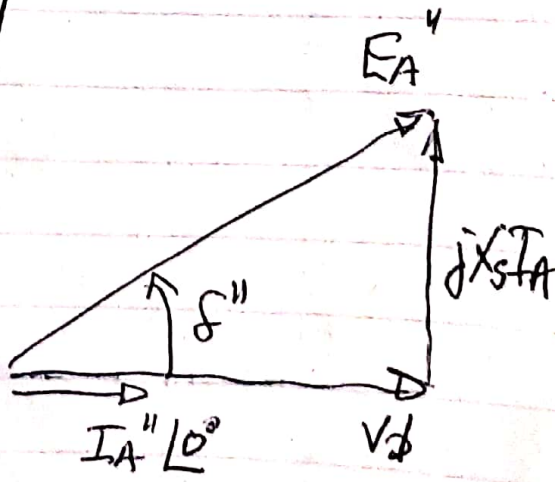
$I_A' = 1.15\, I_F \Rightarrow E_A' \angle \delta' = 1.15\, E_A \angle \delta$

$E_A' \operatorname{sen}\delta' = E_A \operatorname{sen}\delta$

$$\delta' = \operatorname{Sen}^{-1}\left[\frac{E_A}{E_A'} \operatorname{sen}\delta\right]$$

$$I_A' \angle \phi' = \frac{E_A' \angle \delta' - V_\phi \angle 0^\circ}{j X_S}$$

$$Q' = 3\, V_{\phi,LN}\, I_A' \operatorname{Sen}\phi'$$



c) $Q = 0 = \frac{3 V_\phi}{X_S}\left(E_A'' \cos\delta'' - V_\phi\right)$

$\delta'' = \cos^{-1}\left(\frac{V_\phi}{E_A''}\right)$, $I_A'' \angle \phi'' = \frac{E_A'' \angle \delta'' - V_\phi \angle 0^\circ}{j X_S}$

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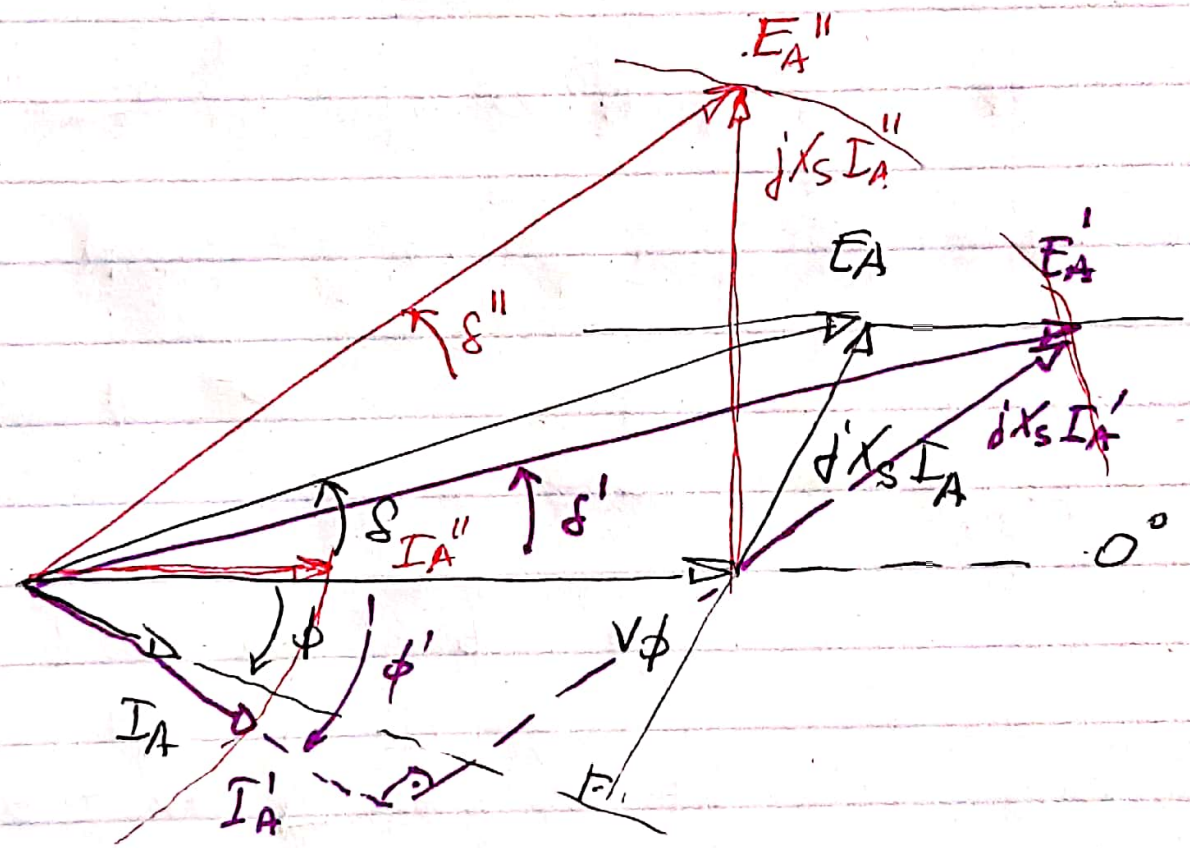
$$P = 3\,V_\phi\,I_A''\cos\phi''$$

d) Con $I_F' = 1.15\,I_F \Rightarrow E_A' = 1.15\,E_A$

$$P_{max}' = \frac{3\,V_\phi}{X_s}\left[E_A' \underbrace{\cos\delta}_{1.0} - V_\phi\right]$$

e)



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Problema #3.

LOAD = 5 MW, pf = 0.8 (-)

a)

G1 : $f_{NL,1} = 61.5$ Hz, $S_{p1} = 1.0$ MW/Hz

G2 : $f_{NL,2} = 61.0$ Hz, $S_{p2} = 1.5$ MW/Hz

$$P_{total} = 5 \times 10^6 = P_1 + P_2$$

$$= S_{p1}(f_{NL,1} - f_{sist}) + S_{p2}(f_{NL,2} - f_{sist})$$

$$= S_{p1} f_{NL,1} + S_{p2} f_{NL,2} - (S_{p1} + S_{p2}) f_{sist}$$

$$f_{sist} = \frac{S_{p1} f_{NL,1} + S_{p2} f_{NL,2} - 5 \times 10^6}{S_{p1} + S_{p2}}$$

$$P_1 = S_{p1}(f_{NL,1} - f_{sist})$$

$$P_2 = S_{p2}(f_{NL,2} - f_{sist})$$

b) $7 \times 10^6 = S_{p1}(f_{NL,1} - 60) + S_{p2}(f_{NL,2} - 60)$?

$$= S_{p1} f_{NL,1} - (S_{p1} + S_{p2}) 60 + S_{p2} f_{NL,2}$$

$$f_{NL,2} = \frac{(S_{p1} + S_{p2}) 60 + 7 \times 10^6 - S_{p1} f_{NL,1}}{S_{p2}}$$

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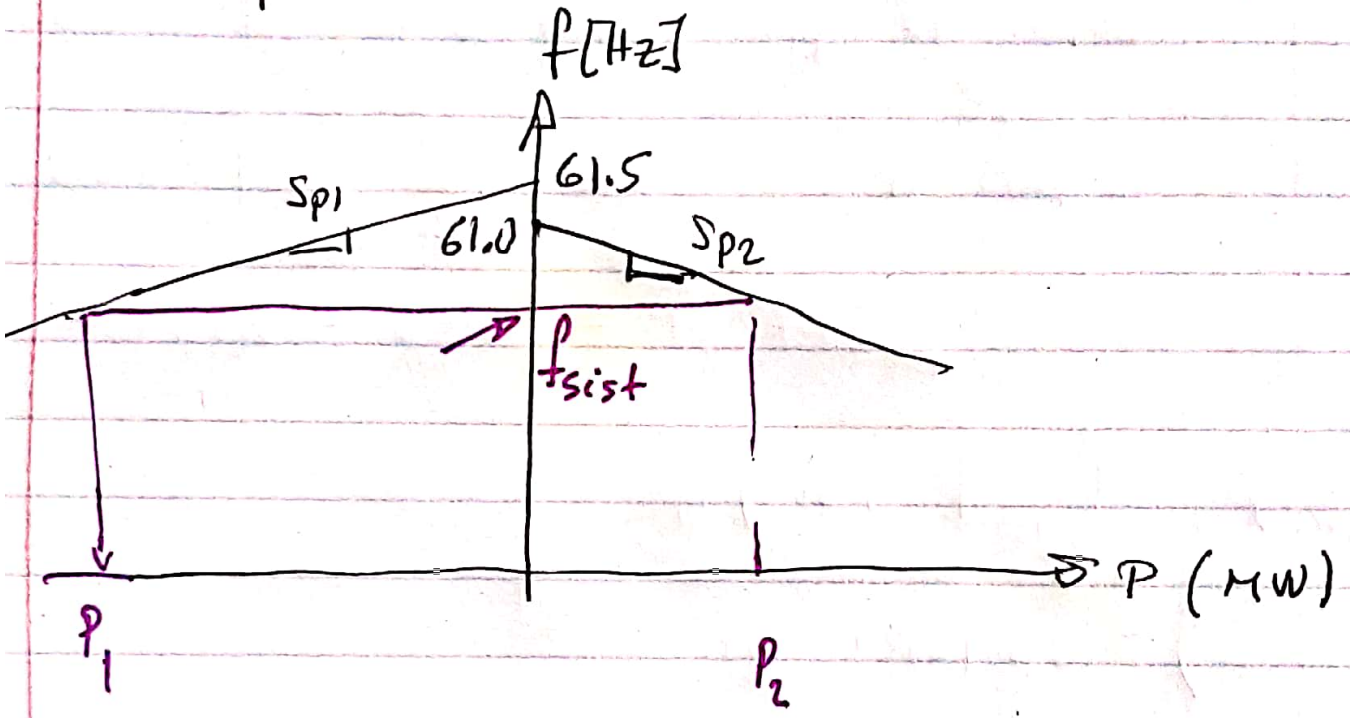
$$P_1 = S_{P1}\left(f_{NL,1} - 60\right)$$

$$P_2 = S_{P2}\left(f_{NL,2} - 60\right)$$



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