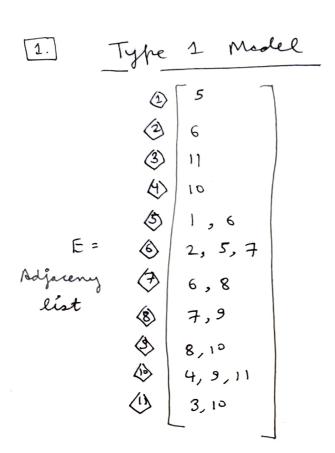
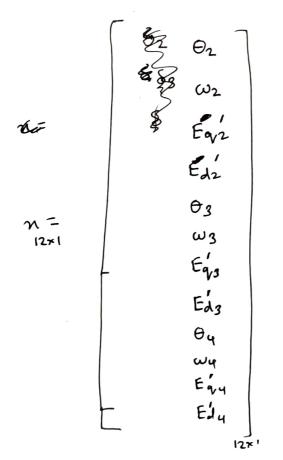
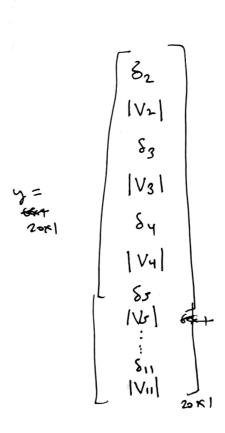
## ASSIGNMENT 04 & EE 523, SPRING 2023 ARYAN RITWATEET JHA



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ENote: of implies that the variables are sitted [12] giver (Pmi, Xdi, Xdi, Xvi, Xqi, Yik, Tik, Akk KDi, Ws, EALI, M. tedized, my writing form flow Pz Pgz - Poz - Pz = 0 (Not, 8k for rangen buses) Vd2 Td2 + Va2 Ta2 - Pp2 - IV2 [ Y2k Vul cos ( Y2k+8k-82)  $|V_2|\sin(\theta_2-\delta_2)\cdot\begin{cases} \frac{\text{Ear}-V_2\cos(\theta_2-\delta_2)}{\text{Xdz'}} \end{cases}$  $+ |V_2| \cos(\theta_2 - \delta_2) \cdot \left\{ \frac{E_{d_2} - V_2 \sin(\theta_2 - \delta_2)}{-X_{q_2}^{\prime}} \right\}$ - PPZ  $- \left[ \frac{G_{22} |V_2|^2}{= 0} + |Y_{25} |V_5 |V_2| \cos(\frac{\pi^2}{25} + \delta_5 - \delta_2) \right]$  $Q_{Q_1} - Q_{Q_2} - Q_2 = 0$  $\left| \frac{1}{2} \right| \left| \frac{1}{2} \right| \cos \left( \frac{1}{2} - \frac{1}{2} \right) \left\{ \frac{1}{2} \left| \frac{1}{2} \right| \frac{1}{2} \left| \frac{1}{2} \left| \frac{1}{2} \right| \frac{1}{2} \left| \frac{1}{2} \right| \frac{1}{2} \left| \frac{1}{2} \left| \frac{1}{2} \right| \frac{1}{2} \left| \frac{1}{2} \right| \frac{1}{2} \left| \frac{1}{2} \right| \frac{1}{2} \left| \frac{1}{2}$  $-|V_2|\sin(0z-\delta z)$   $= \frac{\text{Ed}_2 - V_2\sin(0z-\delta z)}{-X_{N_2}}$ - B221V212 - 1725 V5 V2 ) suis (725 + 65 - SL) = 0

## Simularly, for buses

$$|V_{3}| \sin (\theta_{3} - \delta_{3}) \cdot \left\{ \frac{\text{Eq}_{3} - V_{3} \cos (\theta_{3} - \delta_{3})}{\text{xd}_{3}} \right\}$$

$$+ |V_{3}| \cos (\theta_{3} - \delta_{3}) \cdot \left\{ \frac{\text{Eq}_{4} + \text{Ed}_{3}' - V_{3} \sin (\theta_{3} - \delta_{3})}{-\text{xd}_{3}'} \right\}$$

$$- |V_{3}| \cos (\theta_{3} - \delta_{3}) \cdot \left\{ \frac{\text{Eq}_{4} + \text{Ed}_{3}' - V_{3} \sin (\theta_{3} - \delta_{3})}{-\text{xd}_{3}'} \right\}$$

$$- |V_{3}| |V_{3}|^{2} + |V_{3}| |V_{11}| |V_{3}| |\cos (v_{3}, v_{3}) + \delta_{11}| - \delta_{3}$$

$$= 0$$

$$|V_{3}| \cos(\theta_{3} - \delta_{3}) \cdot \begin{cases} \frac{E_{\eta'_{3}} - V_{3} \cos(\theta_{3} - \delta_{3})}{X_{d'_{3}}} \end{cases}$$

$$= |V_{3}| \sin(\theta_{3} - \delta_{3}) \cdot \begin{cases} \frac{E_{d'_{3}} - V_{3} \sin(\theta_{3} - \delta_{3})}{-X_{\eta'_{3}}} \end{cases}$$

$$- Q_{0_{3}}$$

$$- [-B_{33}|V_{3}|^{2} - |Y_{3}|^{2} \sin(V_{3}|^{2} + \delta_{11} - \delta_{3})]$$

$$= 0$$



$$-\rho_{DS} = -\left[ G_{SS} |V_{S}|^{2} + |Y_{SK} V_{1} V_{5}| \cos(8751 + \delta_{1} - \delta_{5})^{\frac{1}{6}} + |Y_{56} V_{6} V_{5}| \cos(7656 + \delta_{6} - \delta_{5})^{\frac{1}{6}} \right] = 0$$

Qqs - Qpr - Q5 = 0

$$-P_{06} - \left[G_{66} \left|V_{6}\right|^{2} + \left|Y_{62} V_{2} V_{6}\right| \cos\left(Y_{62} + \delta_{2} - \delta_{6}\right) + \left|Y_{65} V_{5} V_{6}\right| \cos\left(Y_{65} + \delta_{5} - \delta_{6}\right) + \left|Y_{67} V_{7} V_{6}\right| \cos\left(Y_{67} + \delta_{7} - \delta_{6}\right)\right] = 0$$

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-PD7 - [G77 |V4|2 + 1776 V6 V7 | Con (8776+86-87)
                            + 1778 V8 V7 Con ( 278+80-87) =0
-007 - [-B77 |V7] = 1776 V6 V7) AGE (876+ 86-57)
+ 1778 V8 V7) AGE (878+68-67)
                          * 1 778 V8 V7) ava (278 + 88 - 87)] = 0
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$$\left[ -\frac{1}{128} - \left[ \frac{1}{128} |V_8|^2 + \frac{1}{1287} |V_7|^2 |V_8| \cos(787 + 87 - 88) \right] = 0$$

$$+ \left[ \frac{1}{1289} |V_9|^2 \cos(789 + 89 - 88) \right] = 0$$

217

218

-0011 - [-B11,11 |V11] = | Y11,3 V3 V11 | Air (811,13 + 83 - 811) - |Y11,10 VpoV11 | air (811,10 + 610-61)]

(923)

= 0

H 1= 2,3 and 4

$$\theta_i = (\omega_i - 1) \omega_s$$

$$\omega_{i} = \frac{1}{2H_{i}} \sum_{k=1}^{\infty} \left[ P_{m_{i}}^{m_{i}} - \left[ \sum_{k=1}^{\infty} V_{i} \sin(\theta_{i} - \delta_{i}) \cdot \left\{ \frac{E_{\alpha_{i}} - V_{i} \cos(\theta_{i} - \delta_{i})}{X_{\alpha_{i}}} \right\} + V_{i} \cos(\theta_{i} - \delta_{i}) \cdot \left\{ \frac{E_{\alpha_{i}} - V_{i} \sin(\theta_{i} - \delta_{i})}{-X_{\alpha_{i}}} \right\} \right]$$

$$\dot{E}_{\alpha_{i}} = \frac{1}{T_{do_{i}}} \left[ -E_{\alpha_{i}}' - (X_{di} - X_{di}') \left\{ \frac{E_{\alpha_{i}} - V_{i} \cos(o_{i} - s_{i})}{X_{di}'} \right\} \right]$$

$$\dot{E}_{di} = \frac{1}{T_{q'o_i}} \left\{ -E_{d_i} - (\times_{q_i}^{2} - \times_{q_i}^{2}) \right\} \left\{ \frac{E_{d_i} - V_i \sin(o_i - S_i)}{-X_{q_i}^{2}} \right\}$$

Again, 1 = 2,3,4.

Thus,
$$\begin{pmatrix} g(n,y)=0 \\ = 0 \\ 20x1 \end{pmatrix} = \begin{pmatrix} g_1 \\ g_2 \\ g_3 \\ g_4 \\ g_5 \end{pmatrix}$$
supposed the first properties of the first part of the second of the second of the first part of the second of th

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