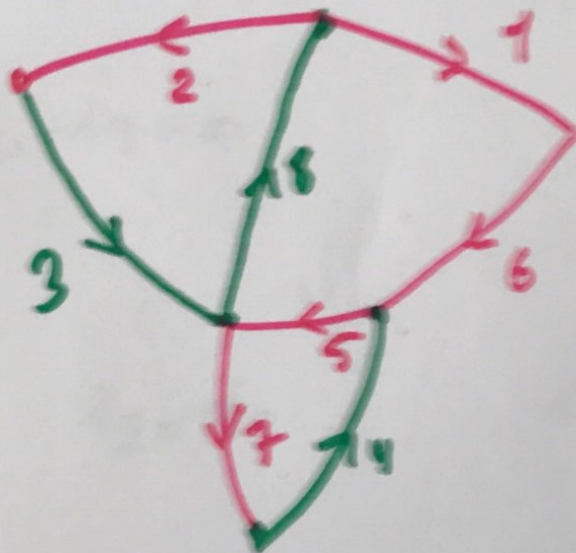


$$G_T = \{1, 2, 5, 6, 7\}$$



$$G_C = \{3, 4, 8\}$$

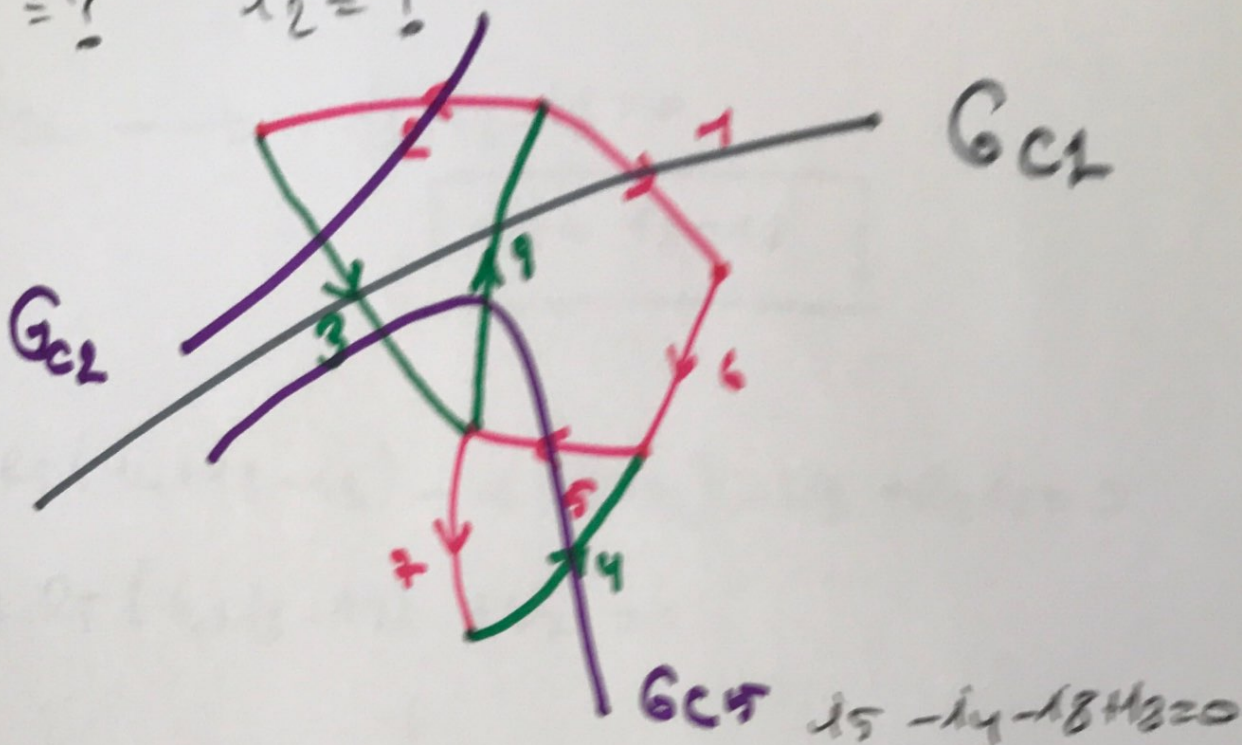
fund. loop eqns. $\left\{ \begin{array}{l} U_3 - U_5 - U_6 - U_4 + U_2 = 0 \\ U_4 + U_5 + U_7 = 0 \end{array} \right.$

$$R_{313} - R_{515} - U_6 - U_4 + R_{212} = 0$$

$$R_{414} + R_{515} + U_7 = 0$$

$$i_5 = ?$$

$$i_2 = ?$$



$$i_2 - i_3 = 0$$



$$i_2 = i_3$$

$$i_5 = i_4 + i_8 - i_3$$

$$R_3 i_3 - R_5 (i_4 + i_8 - i_3) - U_6 - U_1 + R_2 i_2 = 0$$

$$R_4 i_4 + R_5 (i_4 + i_8 - i_3) + U_7 = 0$$

$$U_6 = ? \Rightarrow U_6 = \alpha i_2 \text{ (free.)}$$

$$U_6 = \alpha i_2 \quad i_2 = ?$$

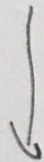
$$G_{c1} = \{1, 3, 8\} \quad \text{from fund. cut-set}$$

$$G_{C1} \rightarrow i_2 + i_3 - i_8 = 0$$

$$\boxed{i_2 = i_8 - i_3}$$

$$R_3 i_3 - R_5 (i_4 + i_8 - i_3) - \alpha (i_8 - i_3) - U_1 + R_2 i_3 = 0$$

$$R_4 i_4 + R_5 (i_4 + i_8 - i_3) + U_2 = 0$$



$$\begin{pmatrix} R_3 + R_5 + \alpha + R_2 & -R_5 \\ -R_5 & R_4 + R_5 \end{pmatrix} \begin{pmatrix} i_3 \\ i_4 \end{pmatrix} + \begin{pmatrix} -R_5 - \alpha \\ R_5 \end{pmatrix} i_8 + \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} U_1 \\ U_2 \end{pmatrix} = 0$$