General transformation procedure for C_1 and C_2.......

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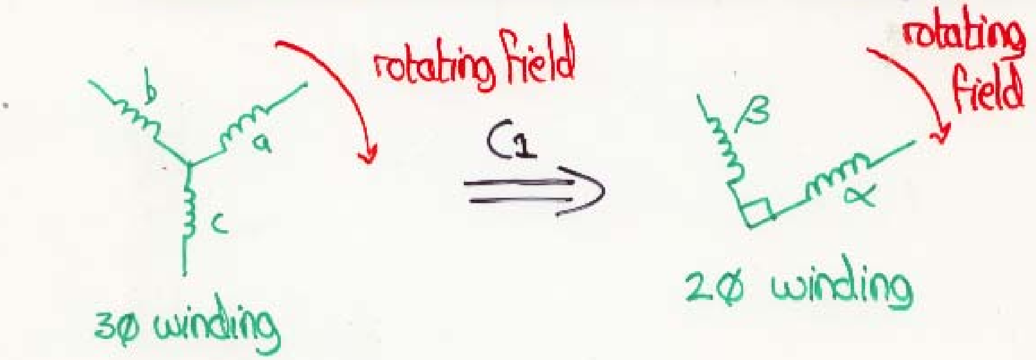
THE TRANSFORMATIONS.

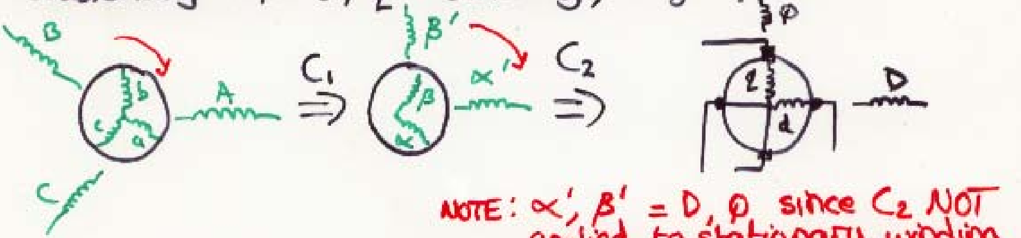
C_1 → PHASE TRANSFORMATION.......

- transforms 3Ø winding to a 2Ø winding equivalent:



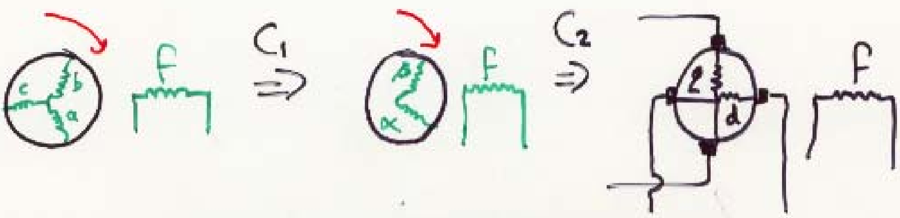
C_2 → COMMUTATOR TRANSFORMATION.......

- transforms rotating 2Ø α, β winding into a stationary 2Ø d, q winding, e.g. I/M.....



NOTE: α', β' = D, Q since C_2 NOT applied to stationary winding.

· synchronous m/c :-



C_3 → SYMMETRICAL COMPONENTS TRANSFORMATION.....

- Used to study unbalanced operation.

Expanded form of the currents and voltages of 3-phase and 2-phase windings having the same airgap MMF distribution.......

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Can show the currents & voltages in expanded form:

$I = CI'$ & $V = CV'$.

$$i_a = \sqrt{\frac{2}{3}}\left(\frac{1}{\sqrt{2}} i_0 + i_\alpha\right) \qquad v_a = \sqrt{\frac{2}{3}}\left(\frac{1}{\sqrt{2}} v_0 + v_\alpha\right)$$

$$i_b = \sqrt{\frac{2}{3}}\left(\frac{1}{\sqrt{2}} i_0 - \frac{1}{2} i_\alpha - \frac{\sqrt{3}}{2} i_\beta\right) \qquad v_b = \sqrt{\frac{2}{3}}\left(\frac{1}{\sqrt{2}} v_0 - \frac{1}{2} v_\alpha - \frac{\sqrt{3}}{2} v_\beta\right)$$

$$i_c = \sqrt{\frac{2}{3}}\left(\frac{1}{\sqrt{2}} i_0 - \frac{1}{2} i_\alpha + \frac{\sqrt{3}}{2} i_\beta\right) \qquad v_c = \sqrt{\frac{2}{3}}\left(\frac{1}{\sqrt{2}} v_0 - \frac{1}{2} v_\alpha + \frac{\sqrt{3}}{2} v_\beta\right)$$

· Similarly, the inverse current & voltage transformations $I' = C_t^* I$ & $V' = C_t^* V$ may be found....

$$i_\alpha = \sqrt{\frac{2}{3}}\left(i_a - \frac{1}{2} i_b - \frac{1}{2} i_c\right) \qquad v_\alpha = \sqrt{\frac{2}{3}}\left(v_a - \frac{1}{2} v_b - \frac{1}{2} v_c\right)$$

$$i_\beta = \frac{1}{\sqrt{2}}\left(-i_b + i_c\right) \qquad v_\beta = \frac{1}{\sqrt{2}}\left(-v_b + v_c\right)$$

$$i_0 = \frac{1}{\sqrt{3}}\left(i_a + i_b + i_c\right) \qquad v_0 = \frac{1}{\sqrt{3}}\left(v_a + v_b + v_c\right)$$