PROIECT EI2

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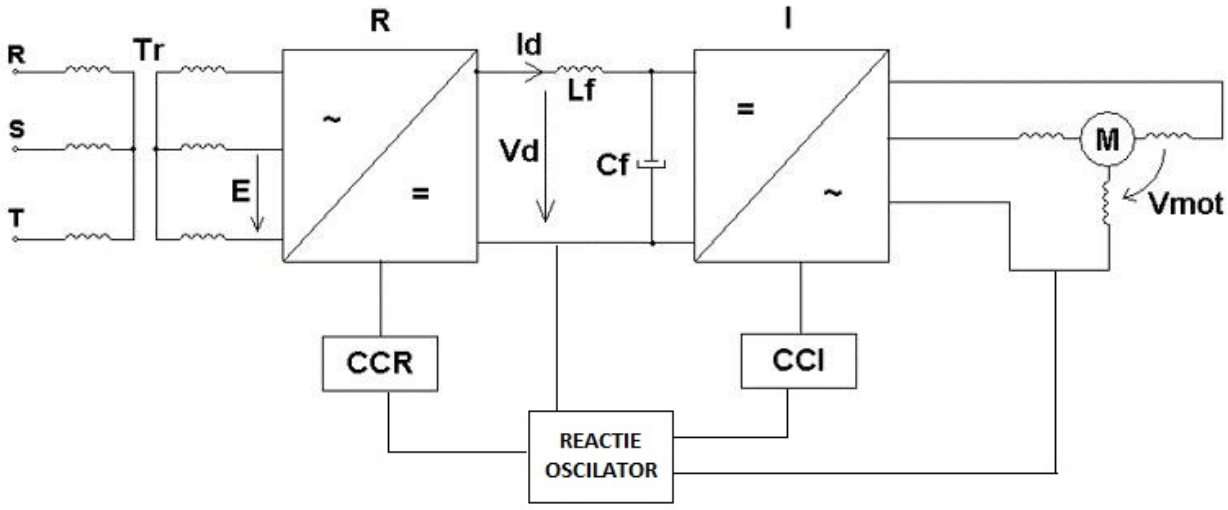
Enunt: sa se realizeze proiectarea unui convertizor static de frecventa cu urmatoarele date:

- V_{motor} = 390 V
- Sm = 10 kVA
- $\Delta f = \{f_{min;}\, f_{max}\} = \{5; 79\}$ Hz
- Tip redresor: RPMT – redresor trifazat cu punct median comandat
- E = 310 V

Schema bloc:



Etapa 1:

$\check{V}$ = valoarea amplitudinii tensiunii de faza

V_{LL} = valoarea efectiva a tensiunii de linie

$$\check{V} = 2 \cdot \frac{1}{T}\left[\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \frac{Vd}{3}\cos(wt)\,dwt + \int_{\frac{-\pi}{6}}^{\frac{\pi}{6}} \frac{Vd}{3}\cos(wt)\,dwt\right]$$

$$\check{V} = \frac{2Vd}{3\pi}\left[\sin(wt)\,dt\Big|_{\frac{-\pi}{2}}^{\frac{\pi}{2}} + \sin(wt)\,dt\Big|_{\frac{-\pi}{6}}^{\frac{\pi}{6}}\right]$$

$$\check{V} = \frac{2Vd}{3\pi}\left[\left(\sin\left(\frac{\pi}{2}\right) - \sin\left(-\frac{\pi}{2}\right)\right) + \left(\sin\left(\frac{\pi}{6}\right) - \sin\left(-\frac{\pi}{6}\right)\right)\right]$$

$$\check{V} = Vd \cdot a$$

$$a = \frac{2}{\pi} \cong 0.636$$

$$V_{LL} = \frac{\sqrt{3}}{\sqrt{2}} \cdot Vd \cdot a \Rightarrow Vd = \frac{\sqrt{2}}{\sqrt{3}a} V_{LL}$$

$$V_{LL} = V_{motor} = 390V$$

$$Vd = \frac{\sqrt{2} \cdot 390}{\sqrt{3} \cdot 0.636} = \frac{551.543}{1.101} = 500.947 \cong 501V$$

Raportul de transformare al transformatorului Tr este n = 1.7 =>

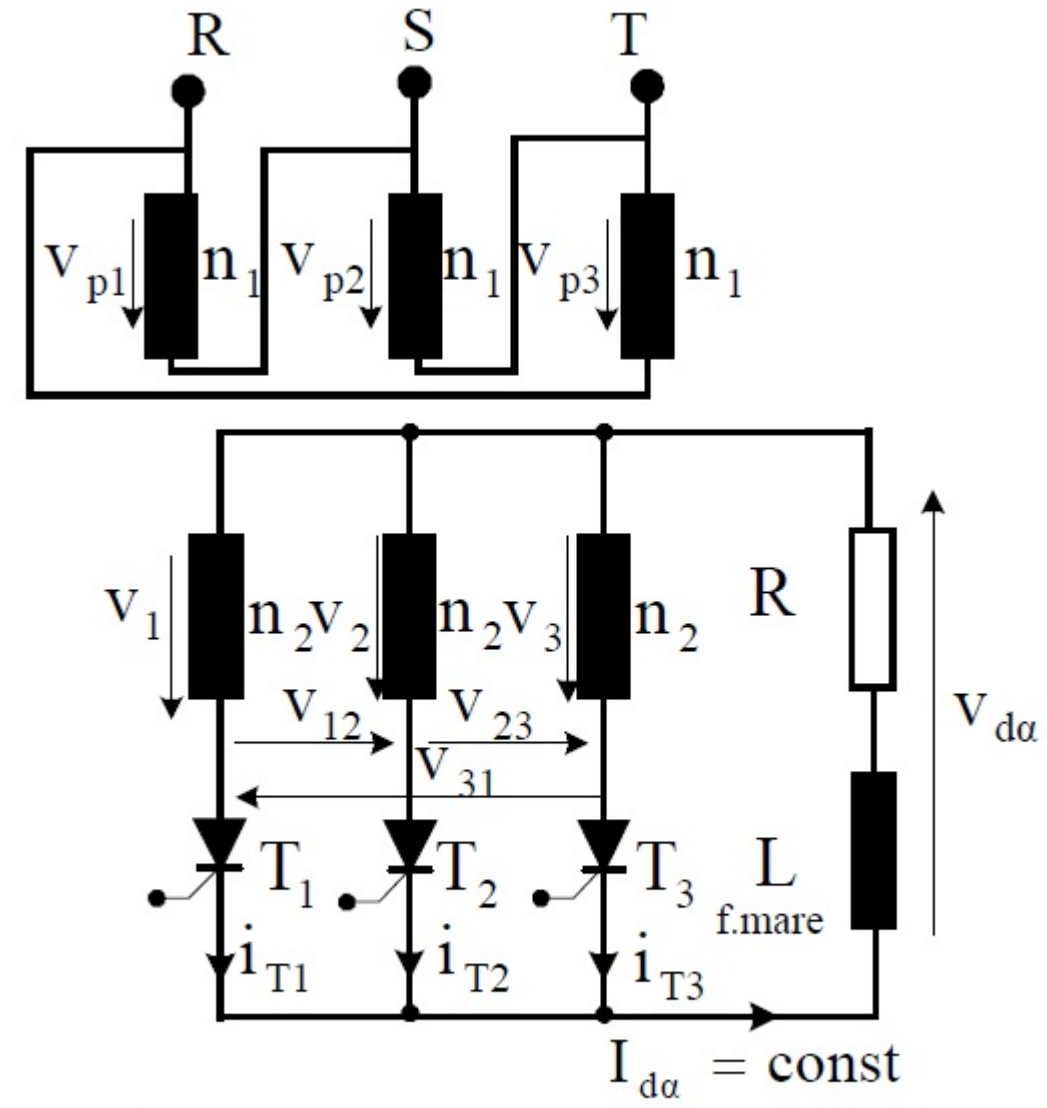
*=> E = 1.7 * 310 => E = 527V*

Redresorul folosit este de tip trifazat cu punct median comandat =>

$$=> Vd = \frac{3\sqrt{6}}{2\pi} \cdot E \cdot \cos\alpha <=> 501 = \frac{3\sqrt{6} \cdot 527 \cdot \cos}{2\pi} <=> 501 = 616.662 \cos\alpha$$

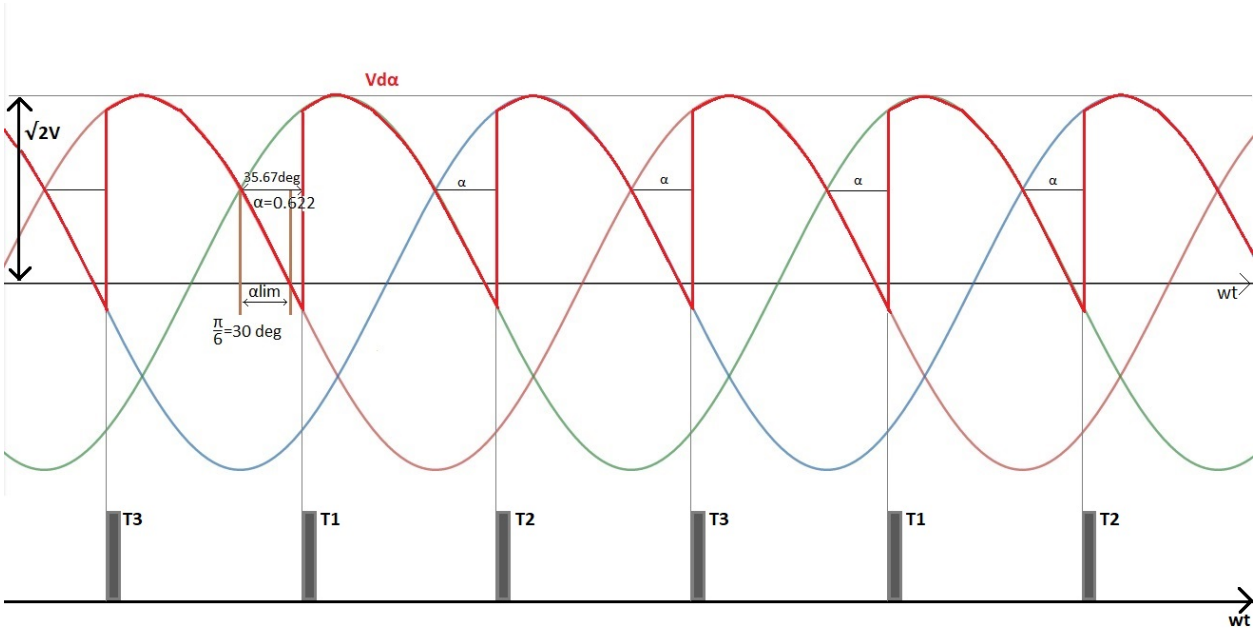
$$\cos\alpha = \frac{501}{616.662} = 0.812352 => \alpha = \cos^{-1}(0.812352) => \alpha = 35.67°$$

Schema redresor trifazat cu punct median comandat:



Redresor trifazat cu punct median funcționând pe sarcină puternic inductivă.

Forma de unda redresata si diagram de conductie a tiristoarelor:



$$Sm = Vd \cdot Id => Id = \frac{Sm}{Vd} = \frac{10^4}{501} => Id \cong 19.96A$$

$$I_{Tavr\alpha} = \frac{\sqrt{6}}{2\pi} Id \cdot cos\alpha = \frac{\sqrt{6} \cdot 19.96}{2\pi} \cdot cos(35.67°) = \frac{48.891 \cdot 0.812}{6.28} =>$$

$$=> I_{Tavr\alpha} \cong 6.32A$$

Se allege un coefficient de siguranta de 1.1 =>

$$I_{Tavr\alpha} = 1.1 \cdot 6.32 = 6.95A => I_{Tavr\alpha} = 7A$$

$$I_{TRM\alpha} = 3 \cdot I_{Tavr\alpha} = 21A$$

$$I_{Trms} = \frac{I_{TRM\alpha}}{\sqrt{3}} \cong 12.3A$$