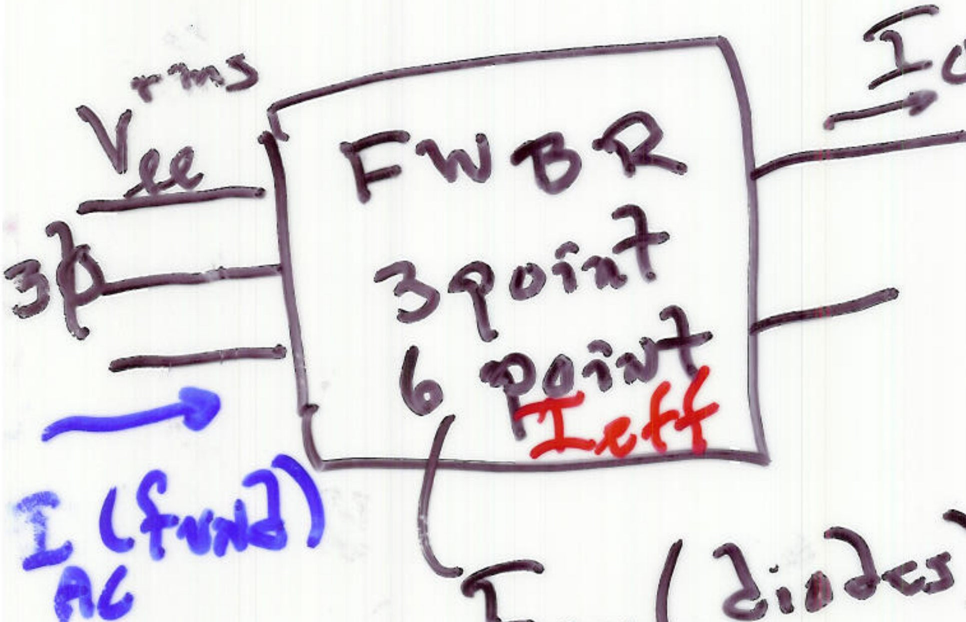
$V_{DC} = 0.9\,V_{rms}$

$I_{Av}(\text{diodes}) = \dfrac{I_o(DC)}{2}$



$V_{DC}^{\text{full wave}} = 1.35\,V_{ll}^{rms}$

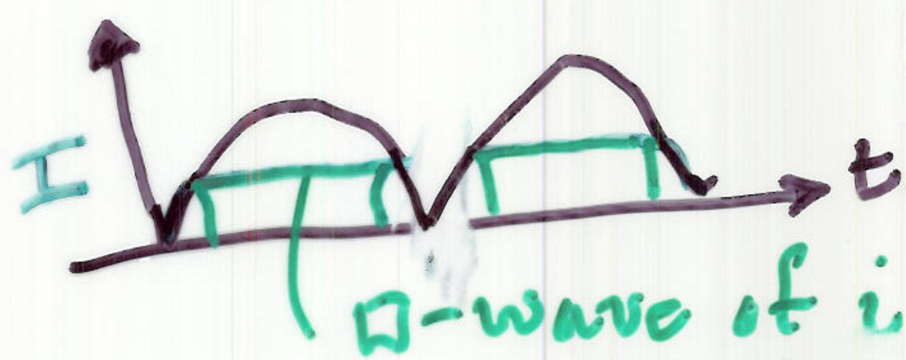
$V_{DC}^{\frac{1}{2}\text{ wave}} = .675\,V_{ll}^{rms}$

$I_{Av}(\text{diodes}) = \dfrac{I_o}{3}$

R_{load}

R-L Load

big

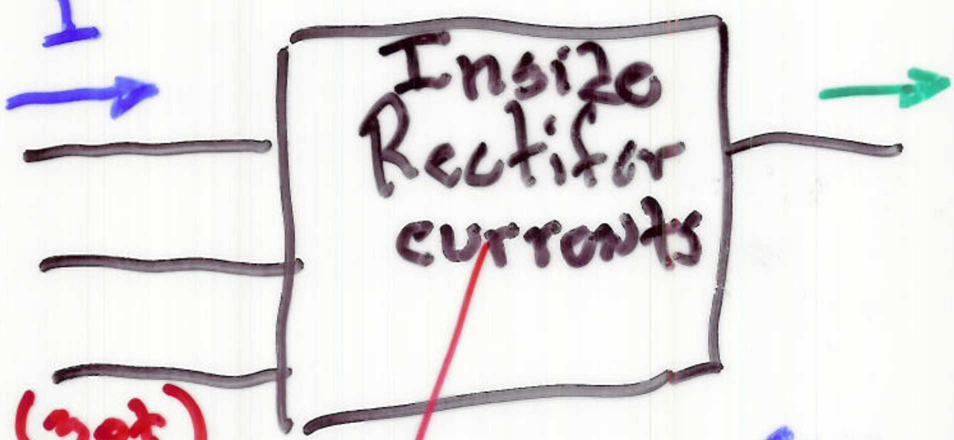


only on for 120°

Mains can only supply $I_{AC}^{fundamental}$

Load is DC

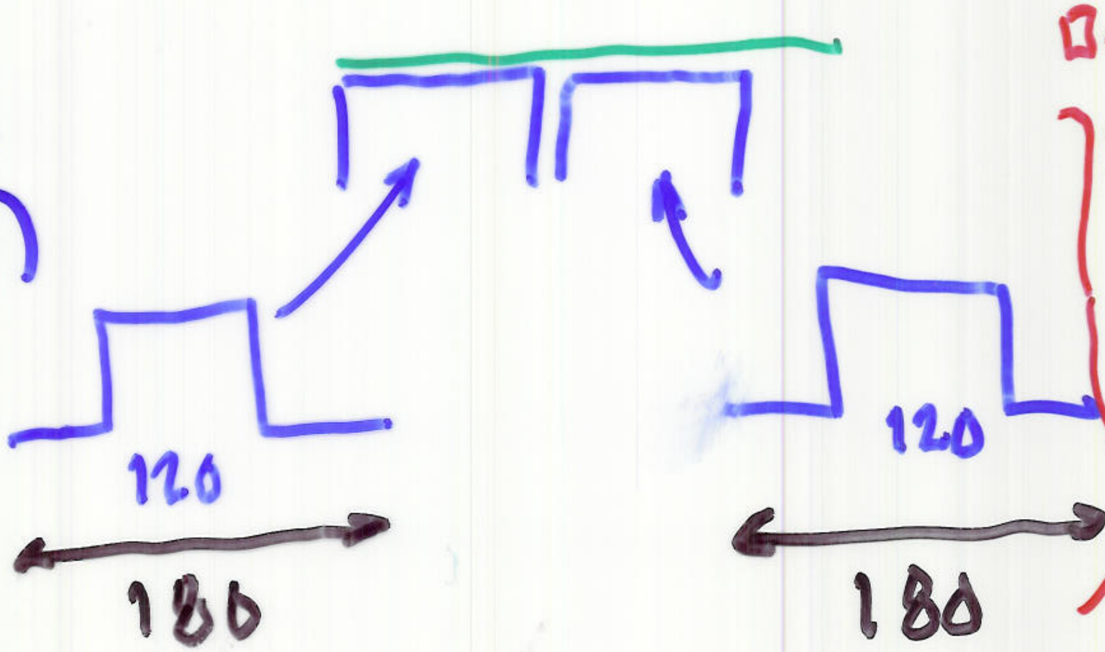
I^f



i(3ph)
on the transformer coils
=
i(diodes)

$$I_{ac}^{eff} = I_f^2 + I_{Harmonics}^{total}$$

diode i(t)

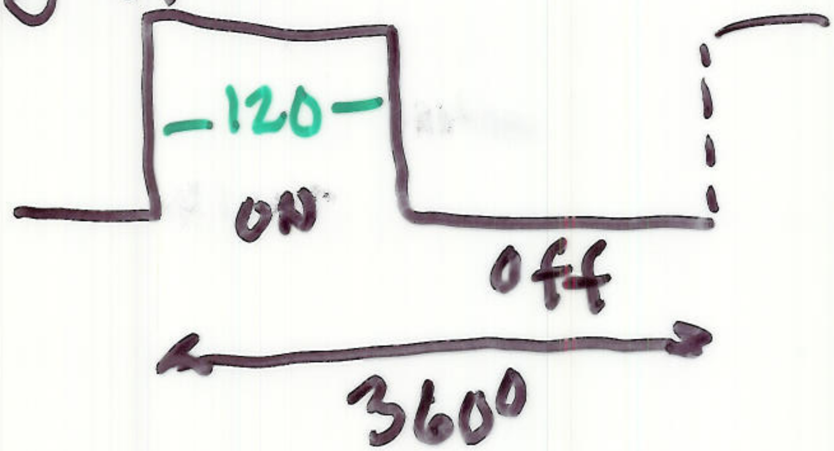


□-wave

I_{AV} vs I_{rms}

□ - waves: I_{Av} vs I_{Rms}

diode $i(t)$

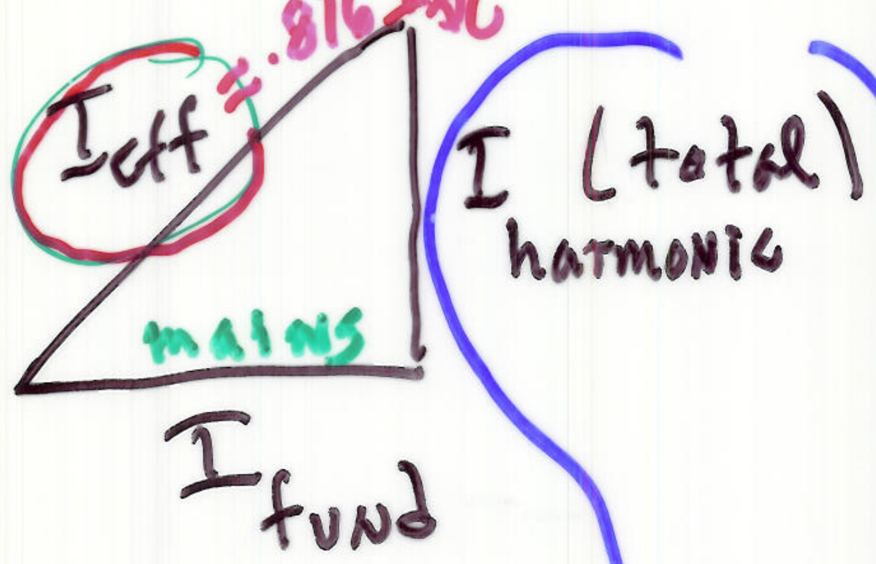


$\leftarrow I_{peak} = I_{DC}$

$$I_{Av}^{diode} = \frac{120}{360} I_{DC} = \frac{I_{DC}}{3}$$

$$I_{Rms} = \sqrt{\frac{120}{360}}\, I_{DC} = 0.816\, I_{DC}$$

I_{eff}



later lectures

$$I_{eff}^2 = I_F^2 + I_H^2$$

Now only find relation $I_{eff} \leftrightarrow I_F$

See Pbm 21.29

For a given DC load: $P_{DC} = E_{DC} I_{DC}$

$\rightarrow I^{fund}$

3φ AC IN

$$P_{AC} = \sqrt{3}\, E_{AC}\, I_{AC}^F$$

$$\sqrt{3}\, E_{AC}^{ll}\, I_{AC}^{fund} = \underbrace{E_{DC}}_{1.35\, E_{AC}^{ll}}\, \underbrace{I_{DC}}_{\frac{I_{AC}^{eff}}{.816}}$$

Mains only sources I^{fund}

$$I_{AC}^{fund} = \underbrace{\frac{1.35}{0.816}\,\frac{1}{\sqrt{3}}}_{.955}\, I_{AC}^{eff}$$

Due to harmonics

$$|I\,(\text{fundamental})| < I_{AC}^{eff}$$

$$\text{Distortion Power Factor} \cong \frac{\text{Active Mains Power}}{\text{Effective Power}}$$

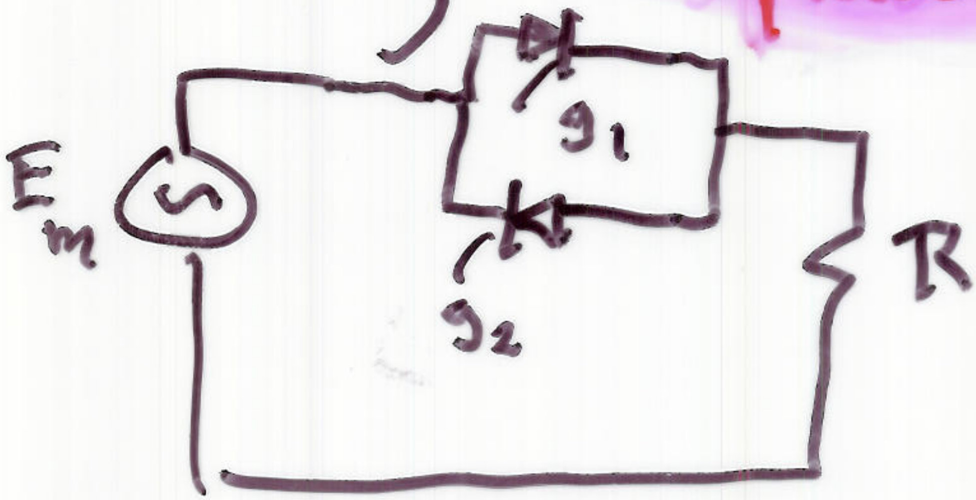
$$= \frac{\sqrt{3}\, V_{ll}\, I\,(\text{fund})}{\sqrt{3}\, V_{ll}\, I_{AC}^{eff}}$$

$$\text{distortion p.f.} = \frac{I_F}{I_{eff}} = 0.955$$

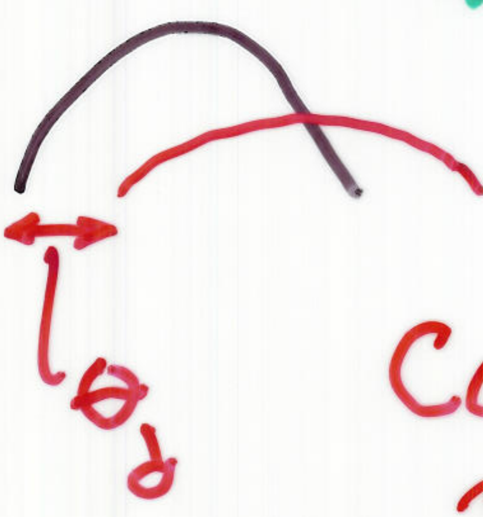
$$I_{eff}^2 = I_F^2 + I_H^2$$

$$\text{Total Harmonic Distortion} \equiv \frac{I_H}{I_F}$$

Coming **Displacement P.F.**



express periodic $i_R(t)$
terms of fundemental @ f_m
harmonics @ $n f_m$



$\cos\theta_d \equiv$
Displacement
Power factor