Synthesis of Single-Phase AC

Applications:

- UPS
- PV Systems

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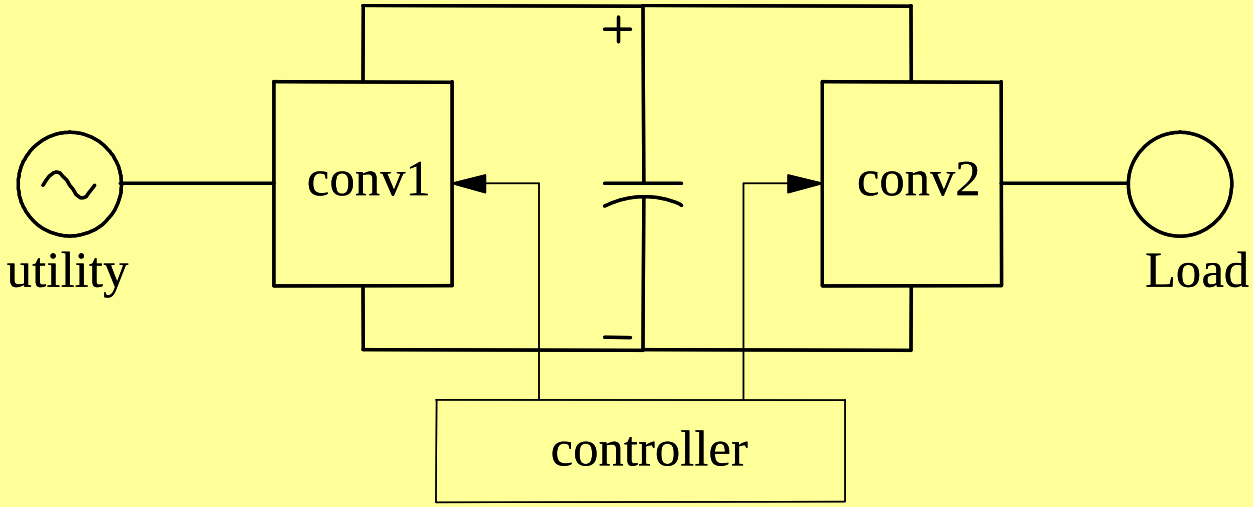

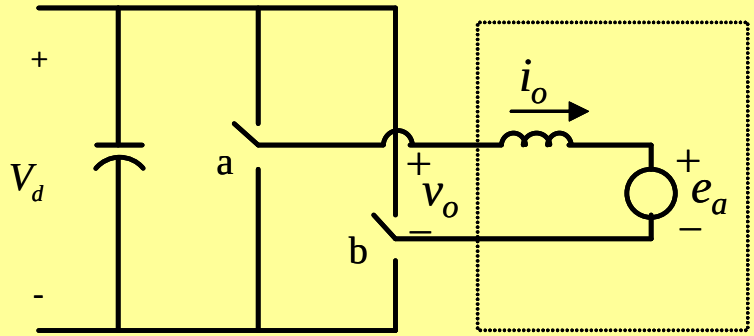

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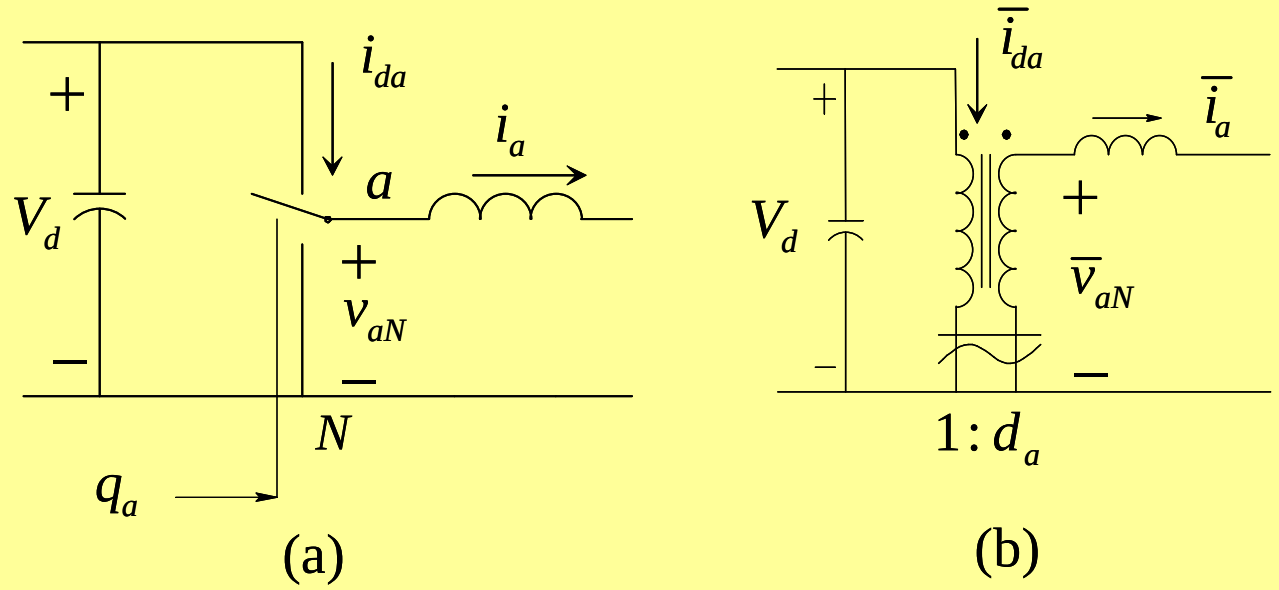
Average Representation of the Switching Power-Pole

$$\overline{v}_{aN} = d_a V_d$$

$$\overline{i}_{da} = d_a \overline{i}_a$$



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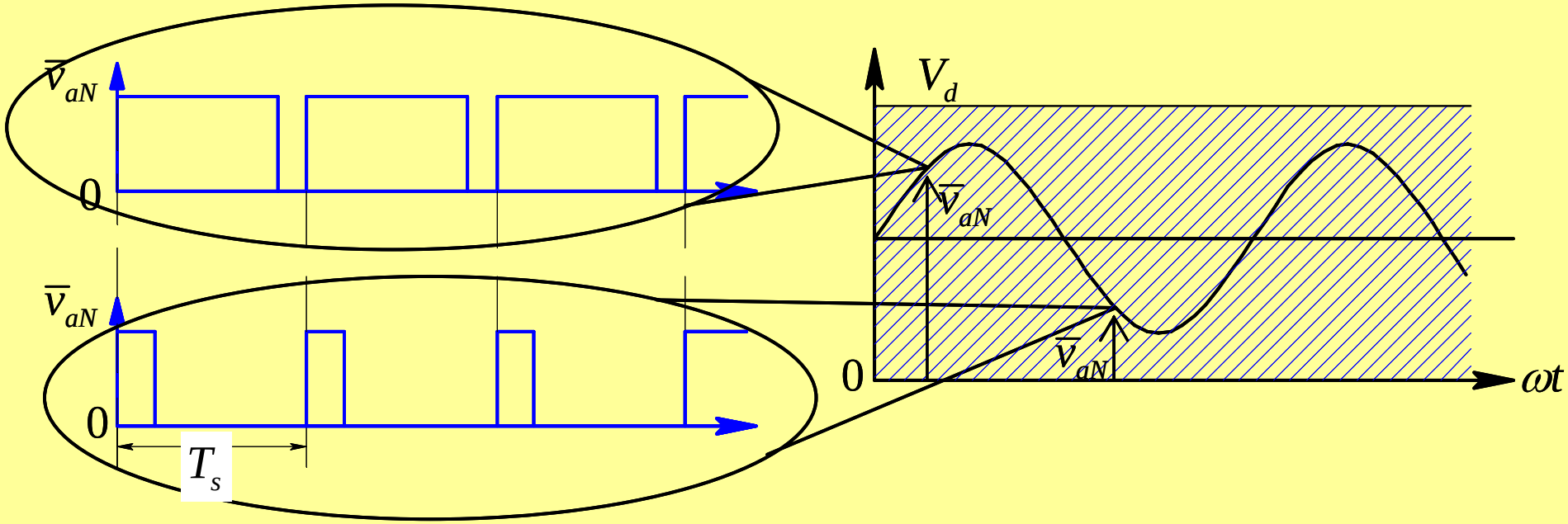
Synthesis of Low-Frequency AC:



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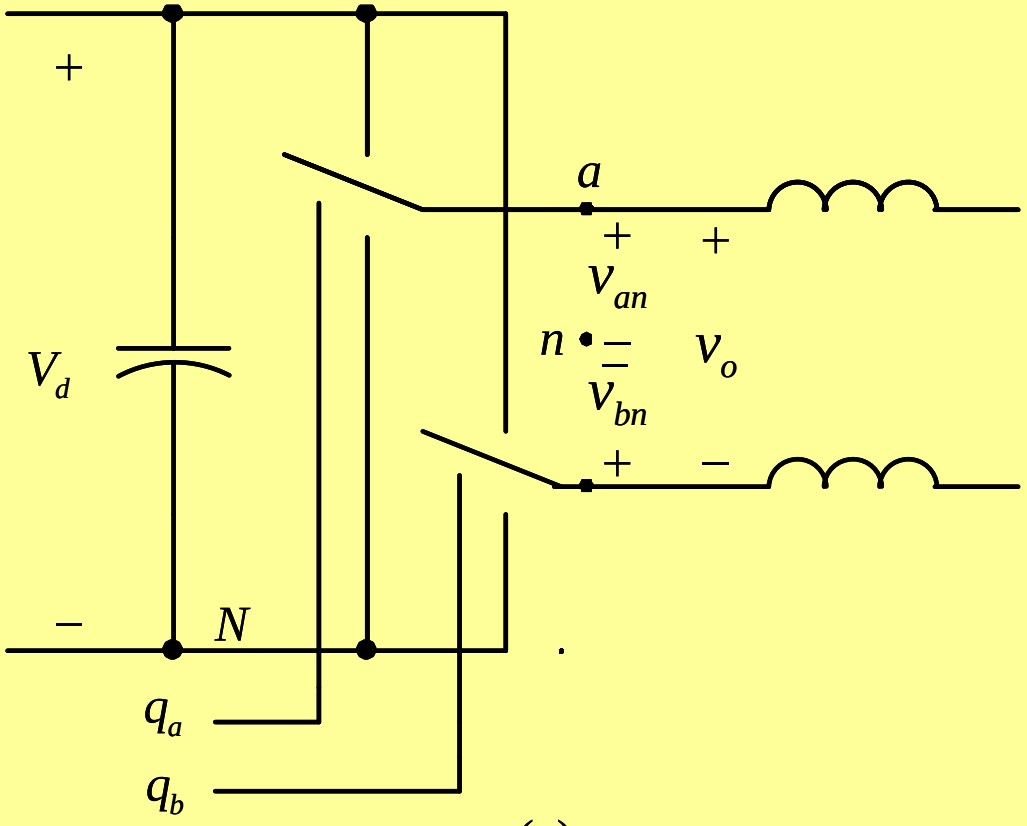
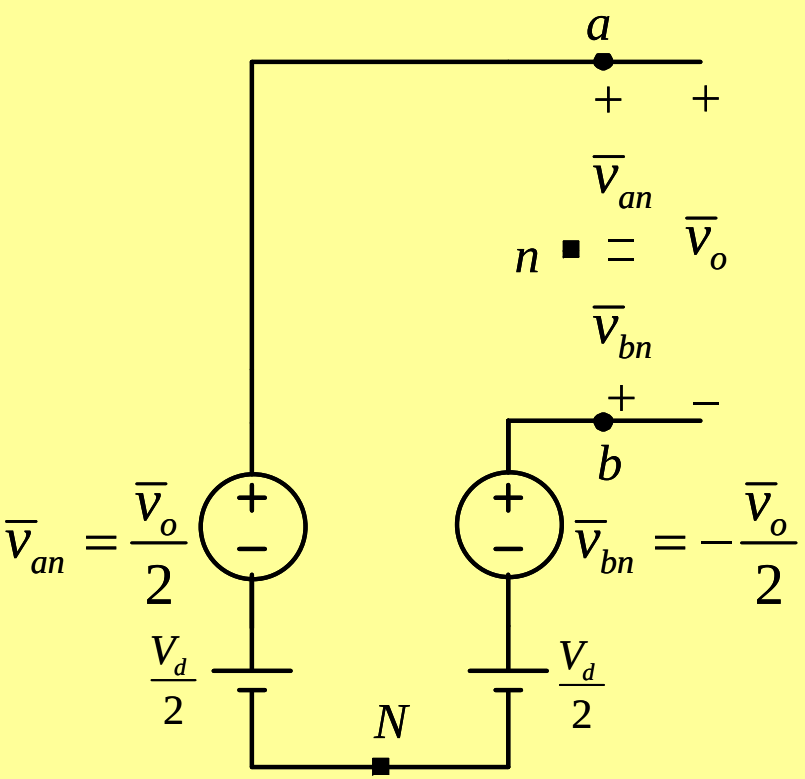
DC-MOTOR DRIVES



(a)



(b)

$$\overline{v}_{an} = \frac{\overline{v}_o}{2}$$

$$\overline{v}_{bn} = -\frac{\overline{v}_o}{2}$$

$$\overline{v}_{com} = \frac{V_d}{2}$$

$$\overline{v}_{aN} = \overline{v}_{com} + \overline{v}_{an}$$

$$\overline{v}_{bN} = \overline{v}_{com} + \overline{v}_{bn}$$

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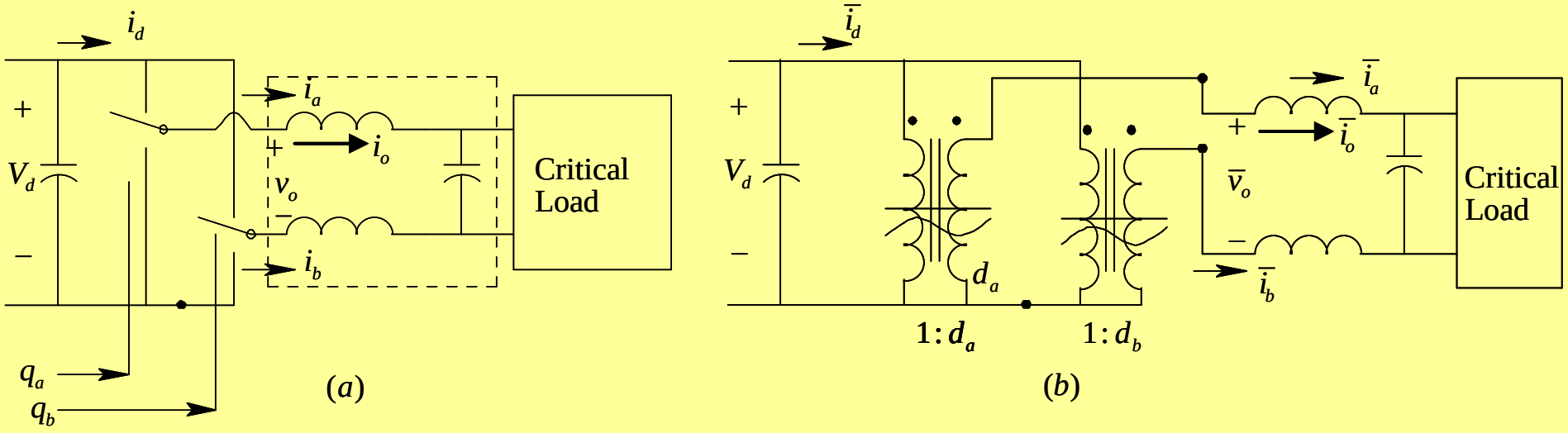
Single-Phase Inverters - UNINTERRUPTIBLE POWER SUPPLIES (UPS) , PV Systems



$$\bar{v}_o = \hat{V}_o \sin \omega_1 t$$

$$\bar{v}_{com} = \frac{V_d}{2}$$

$$\bar{v}_{an} = \frac{\bar{v}_o}{2} \qquad \bar{v}_{bn} = -\frac{\bar{v}_o}{2}$$

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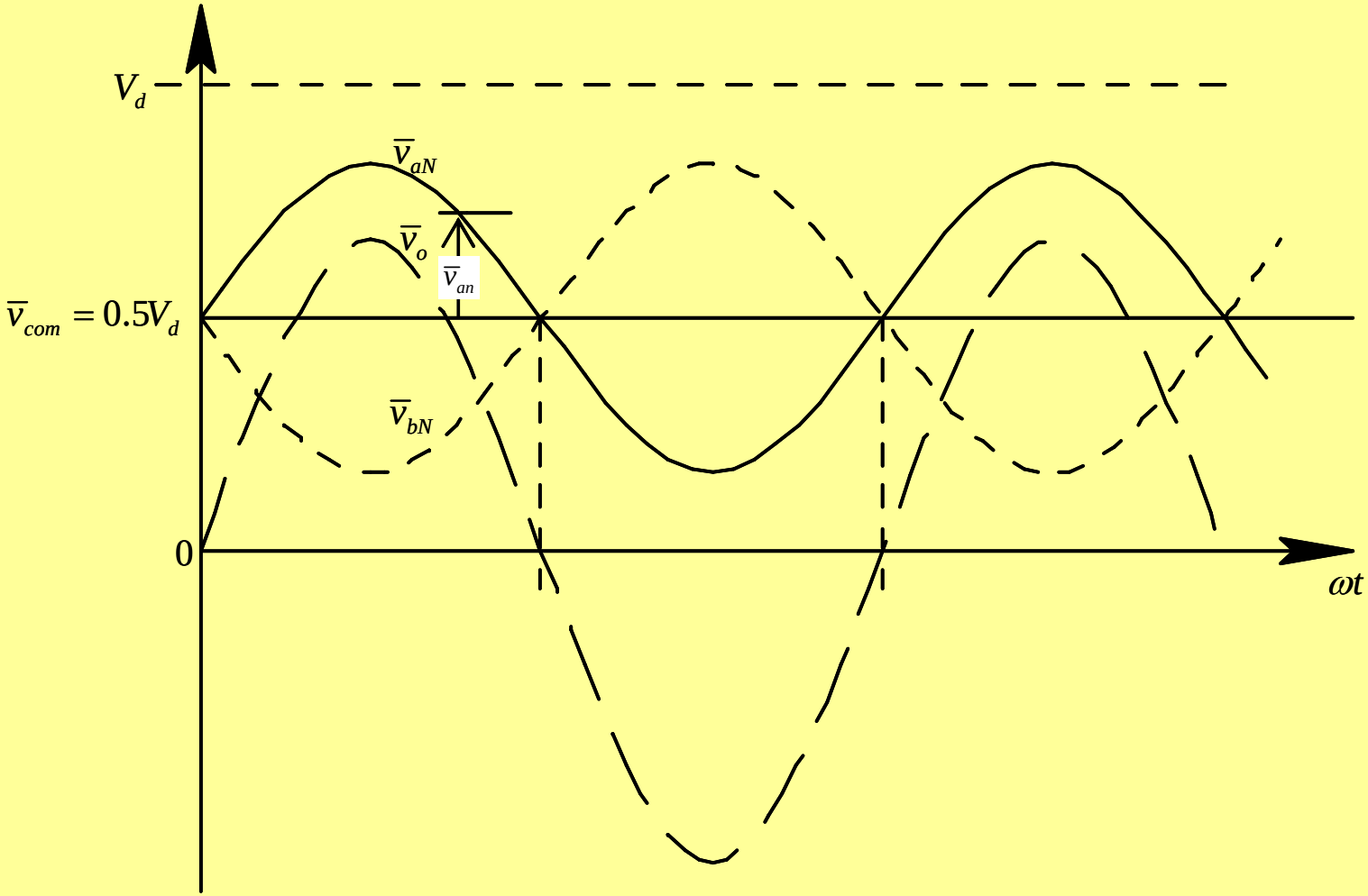
Single-Phase Inverters:

$$\overline{v}_{aN} = \frac{V_d}{2} + \frac{\overline{v}_o}{2} \qquad \overline{v}_{bN} = \frac{V_d}{2} - \frac{\overline{v}_o}{2}$$



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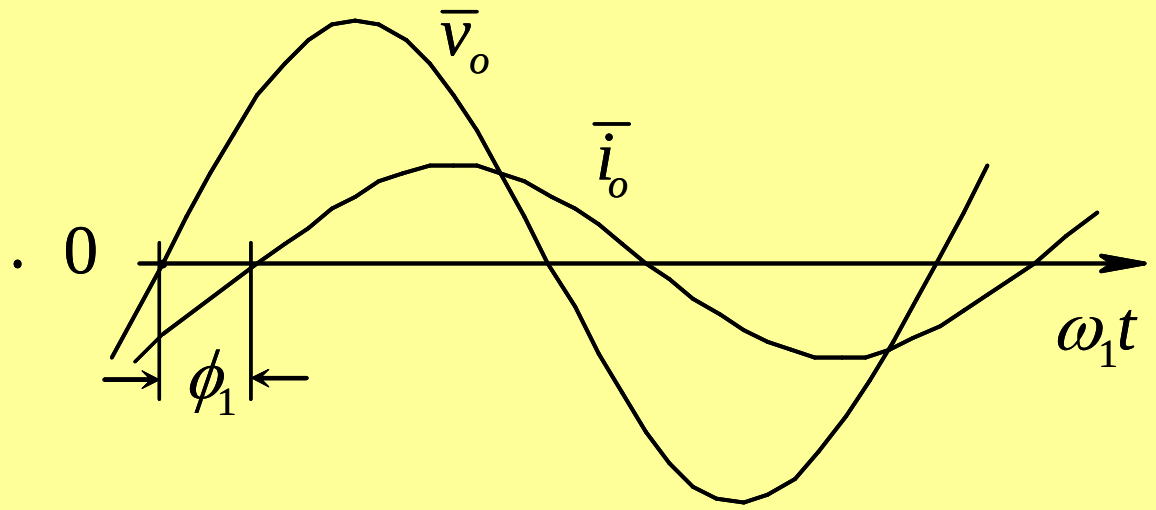
Single-Phase Inverters - Output Voltage and Current:



$$\bar{i}_d = \frac{\bar{v}_o \bar{i}_o}{V_d} = \frac{\hat{V}_0 \hat{I}_o}{V_d} \sin\omega_1 t \times \sin\left(\omega_1 t - \phi_1\right) = \underbrace{0.5\frac{\hat{V}_o}{V_d}\hat{I}_o \cos\phi_1}_{I_d} - \underbrace{0.5\frac{\hat{V}_o}{V_d}\hat{I}_o \cos\left(2\omega_1 t - \phi_1\right)}_{i_{d2}(t)}$$

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Summary

Synthesis of Single-Phase AC:

- UPS
- PV Systems

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