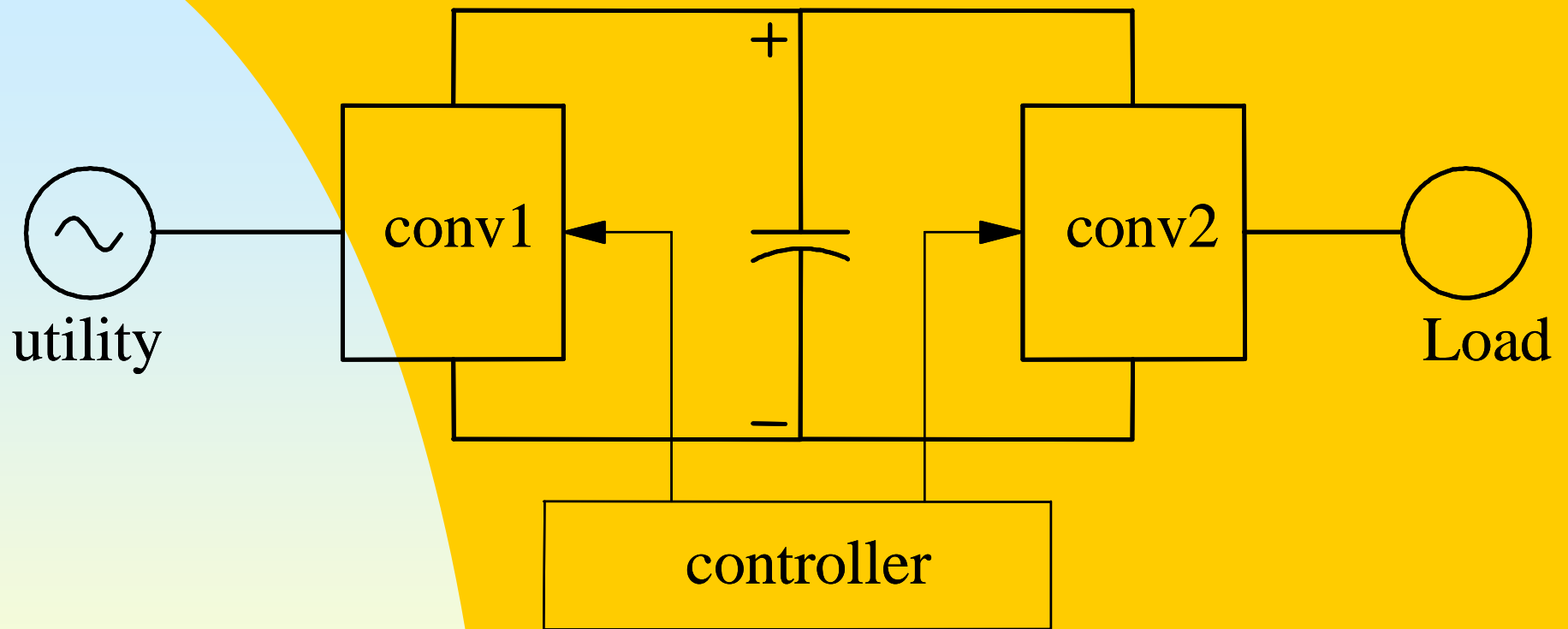


Voltage-Link System



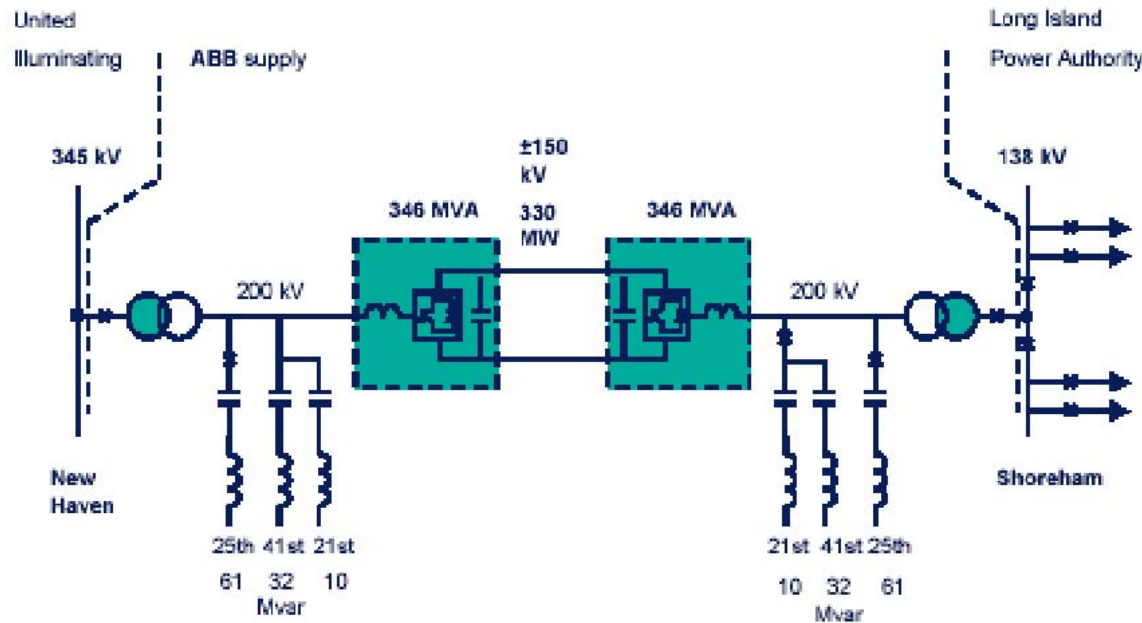
A Voltage-Link HVDC System in Northeastern U.S.

VSC
Projects

Cross Sound Cable HVDC Light Project

Schematic Single Line Diagram

01LC0069



© VSC Transmission - Page 20

ABB

© Copyright Ned Mohan 2008. Fig. 7-20 Voltage-link HVDC transmission system [source: ABB].

Phasor Diagram on the Ac-Side of the Voltage-Link Converter

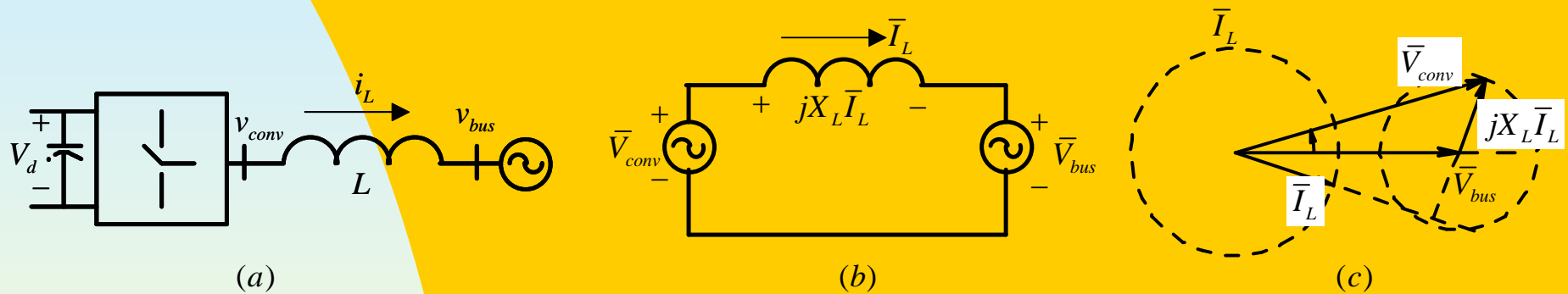


Fig. 7-22 Block diagram of a voltage-link converter and the phasor diagram.

$$\bar{V}_{conv} = \bar{V}_{bus} + jX_L \bar{I}_L$$

Representation of Voltage-Link Converter with Ideal Transformers

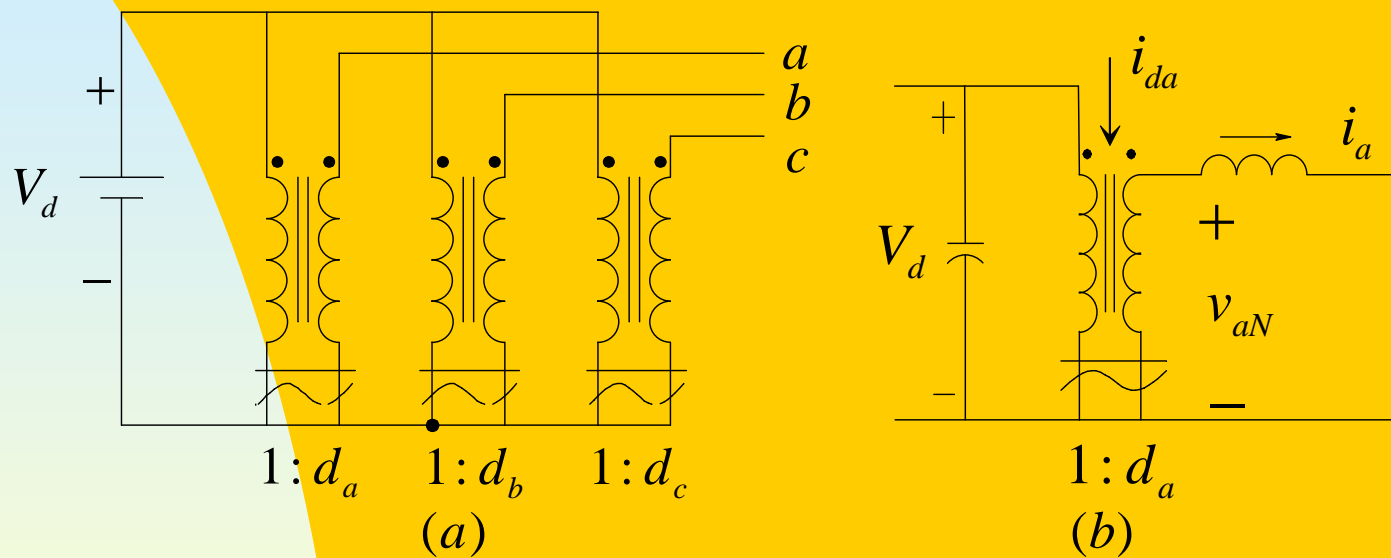


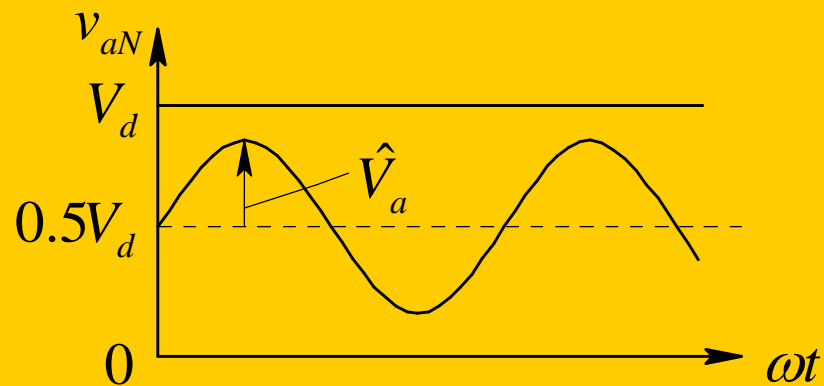
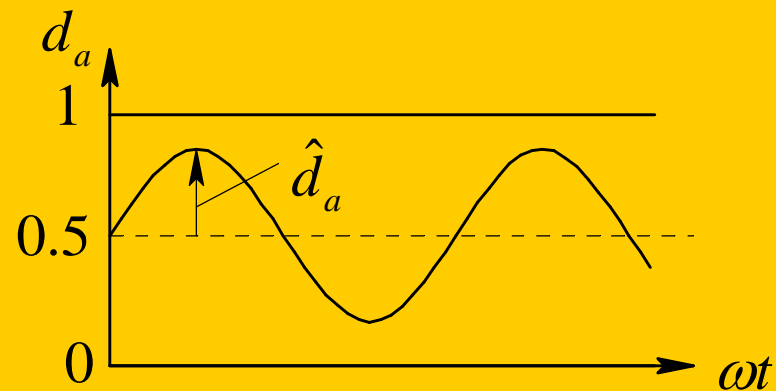
Fig. 7-23 Synthesis of sinusoidal voltages.

Synthesis of "Average" Sinusoidal Voltages

$$v_{aN} = 0.5V_d + \underbrace{\hat{V}_a \sin \omega t}_{v_a}$$

$$d_a = 0.5 + \hat{d}_a \sin \omega t$$

$$\hat{V}_a = \hat{d}_a V_d$$



Converter Output Voltages and Voltages across the Load

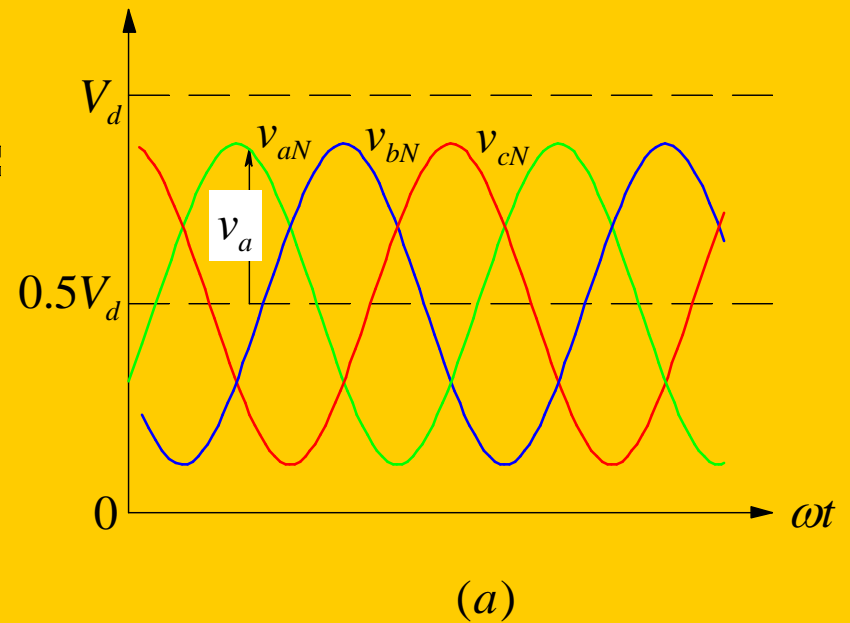
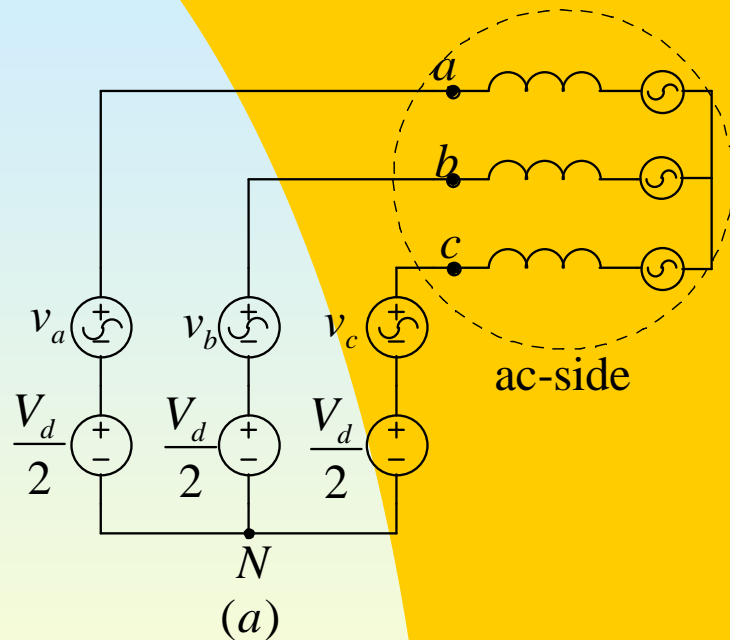


Fig. 7-25 Three-phase synthesis.

Switching Power-Pole of Voltage-Link Converters

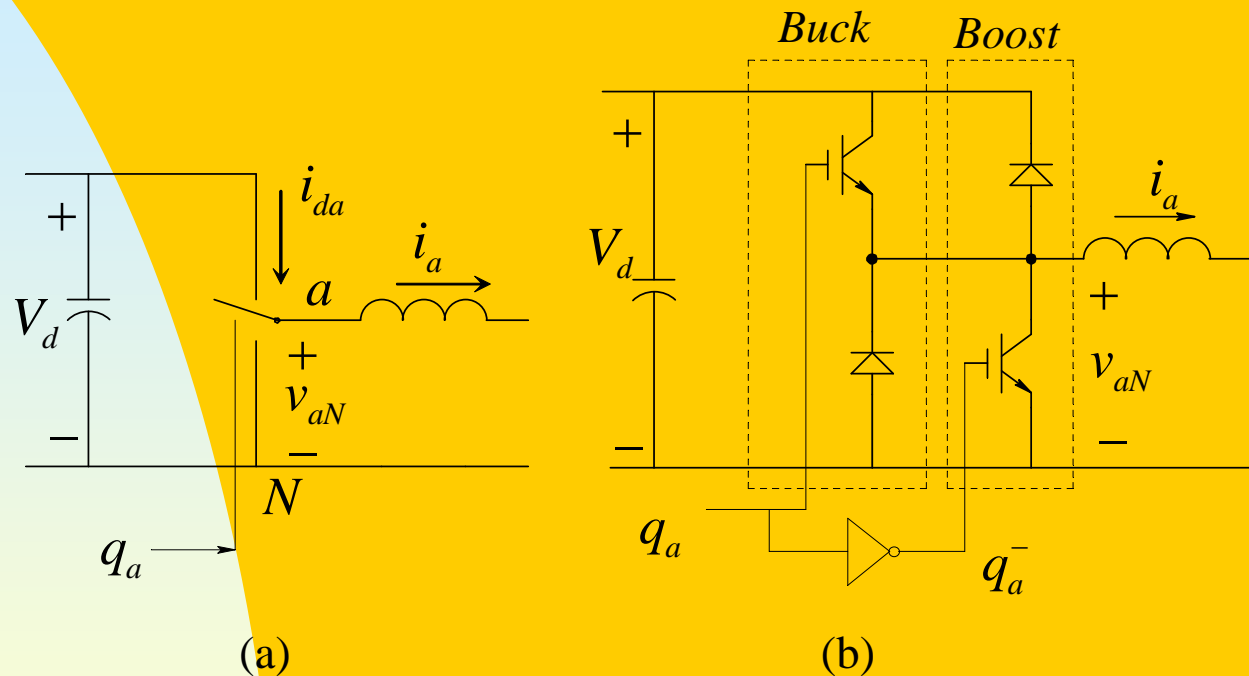
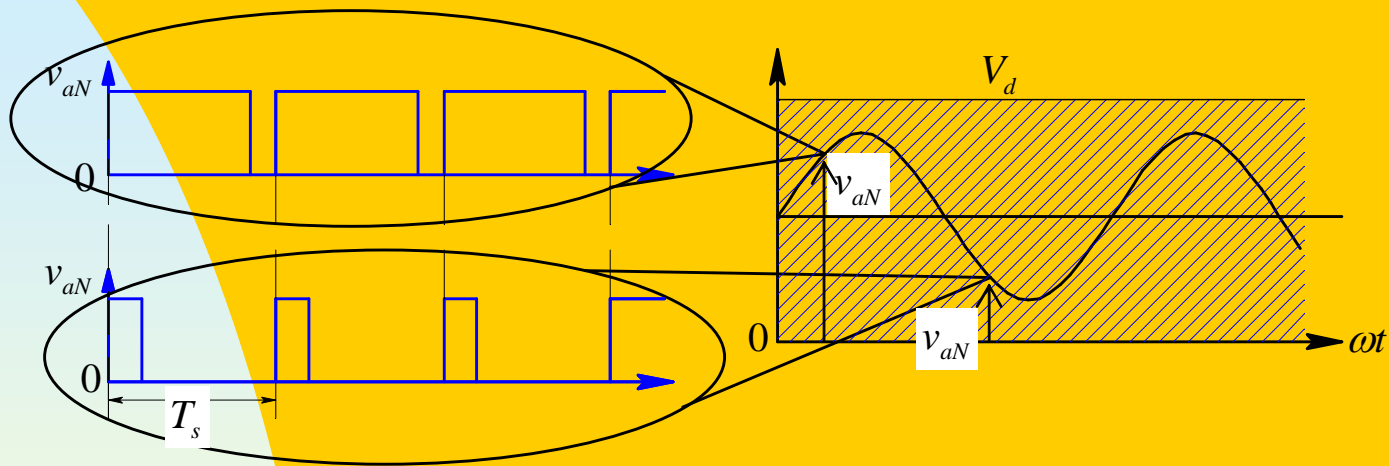


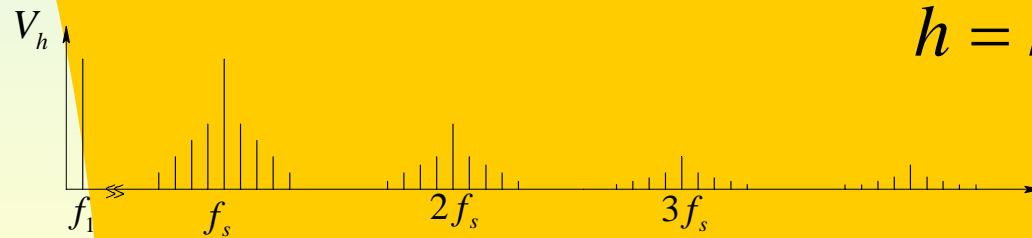
Fig. 7-26 Realization of the ideal transformer functionality.

$$\underbrace{v_{aN}}_{\text{average}} = d_a V_d \quad d_a = \frac{T_{up}}{T_s}$$

Switching in Sinusoidal "Average" Voltage Waveform



(a)



(b)

$$h = k_1 f_s \pm k_2 f_0$$

Fig. 7-27 PWM to synthesize sinusoidal waveform.

Summary

- Introduction
- Power Semiconductor Devices
- HVDC Systems
- Current-Link Systems
- Thyristor Converters
- Power Flow in Current-Link Systems
- Voltage-Link Systems