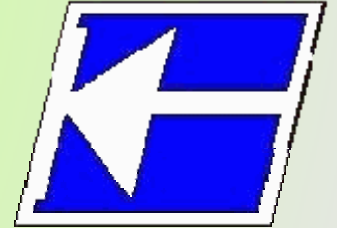


Centro Federal de Educação Tecnológica de Santa Catarina
Departamento Acadêmico de Eletrônica
Conversores Estáticos



Introdução aos Conversores CA-CA

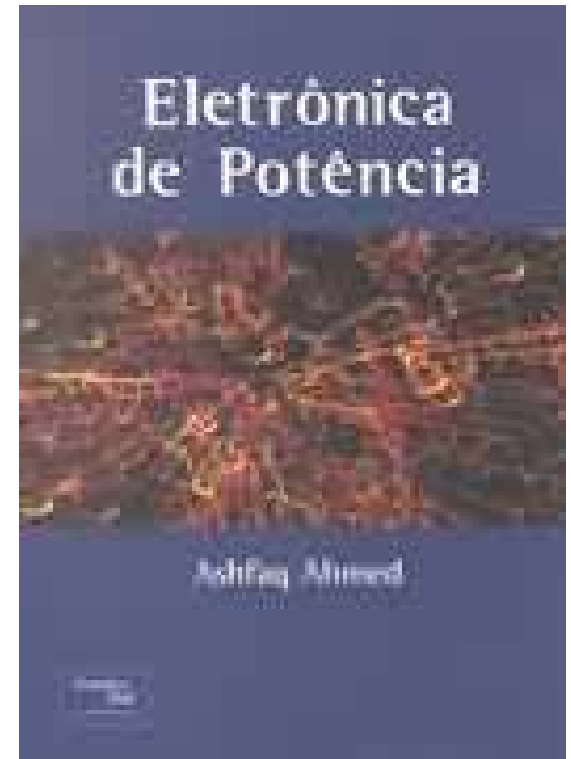
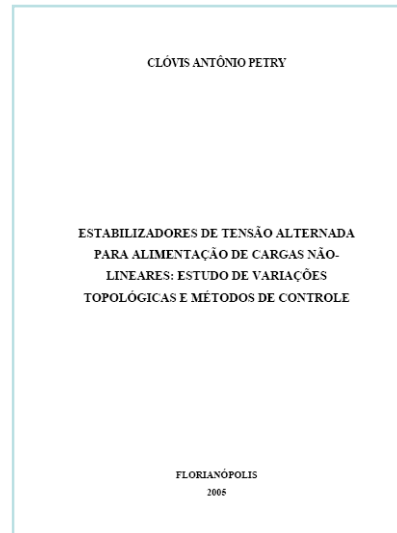
Prof. Clóvis Antônio Petry.

Florianópolis, março de 2008.

Bibliografia para esta aula

Capítulo 11: Controladores de tensão AC

1. Introdução.



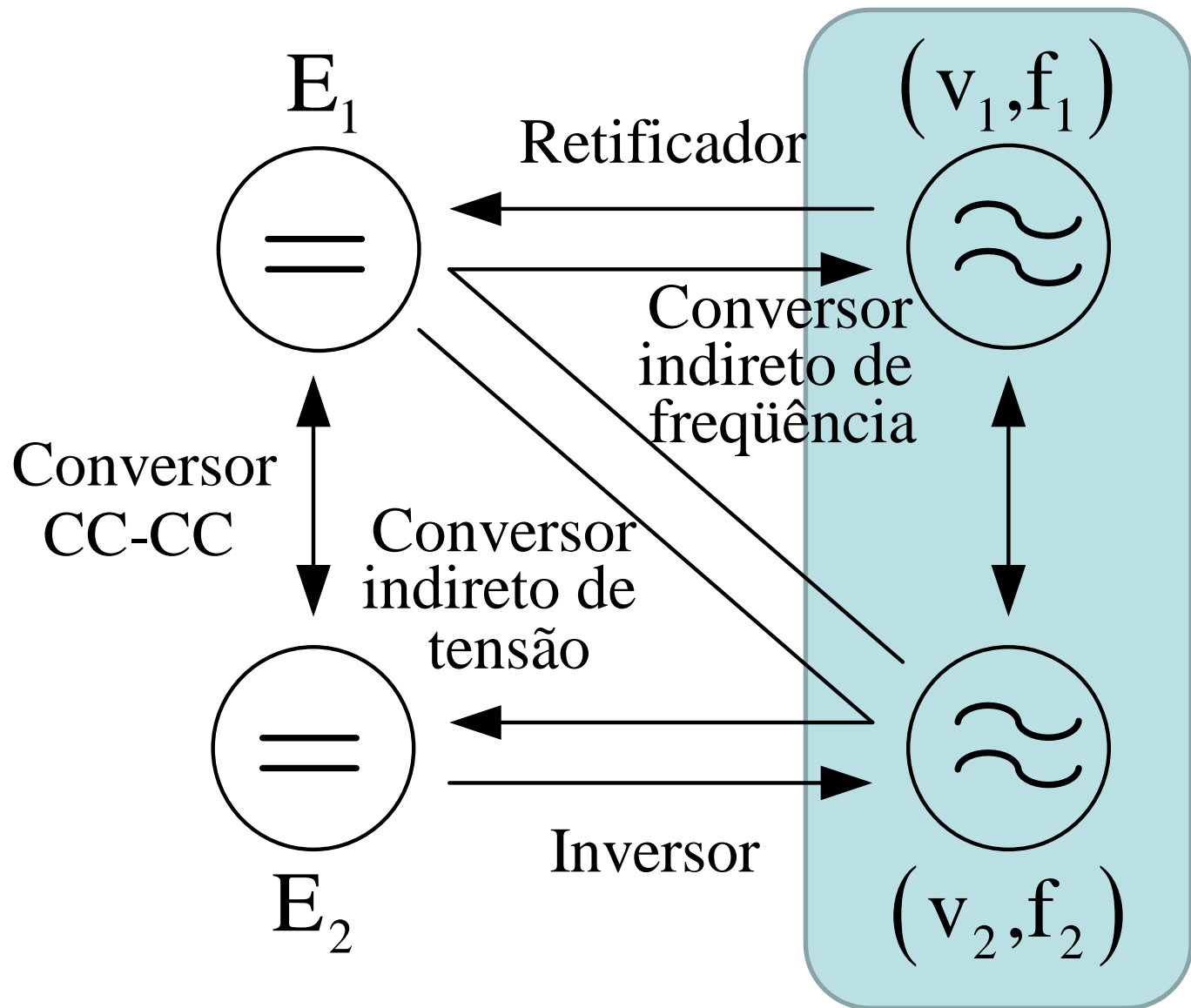
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Nesta aula

Conversores CA-CA:

1. Características gerais e aplicações.

Divisão da eletrônica de potência

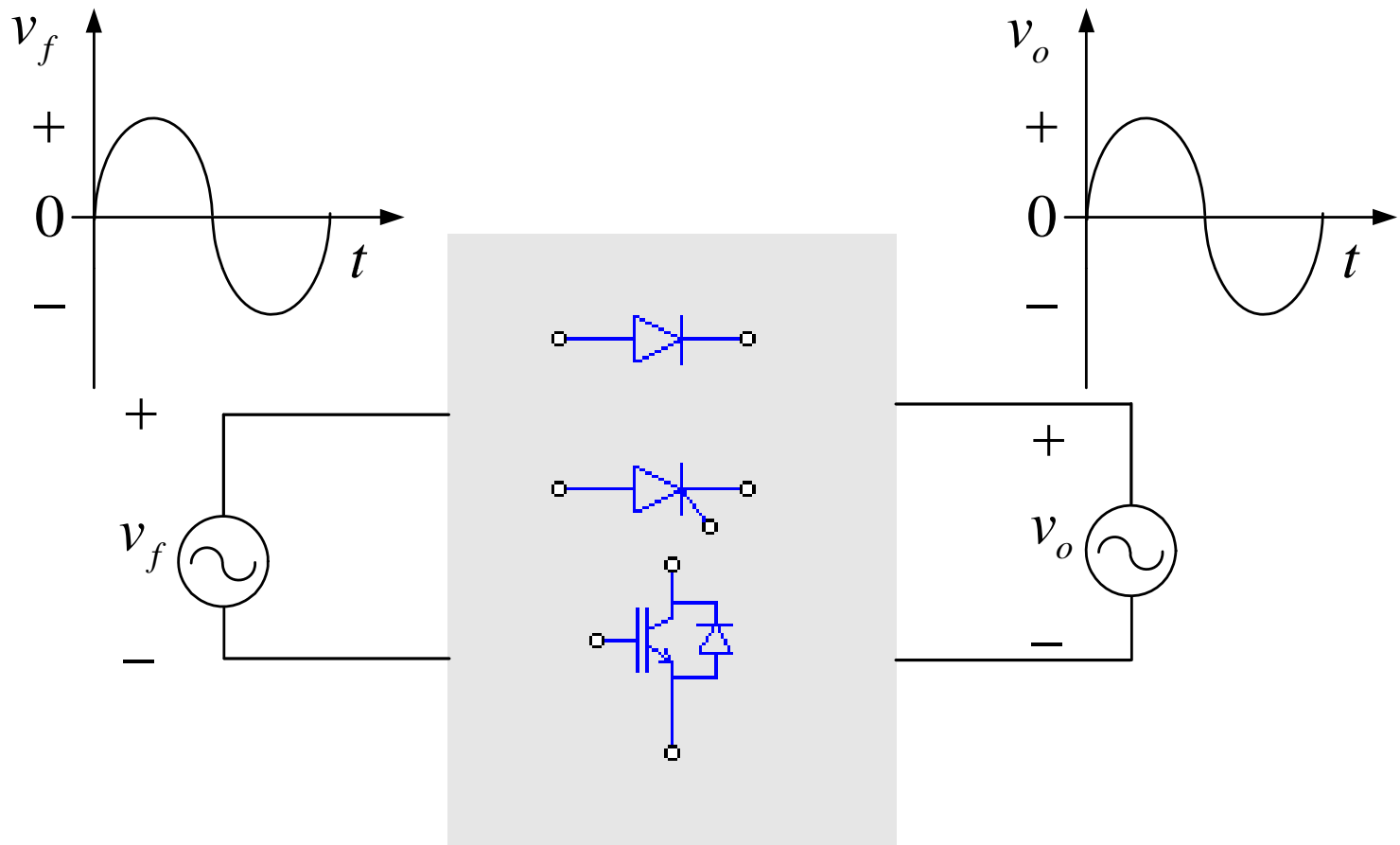


Conversores CA-CA

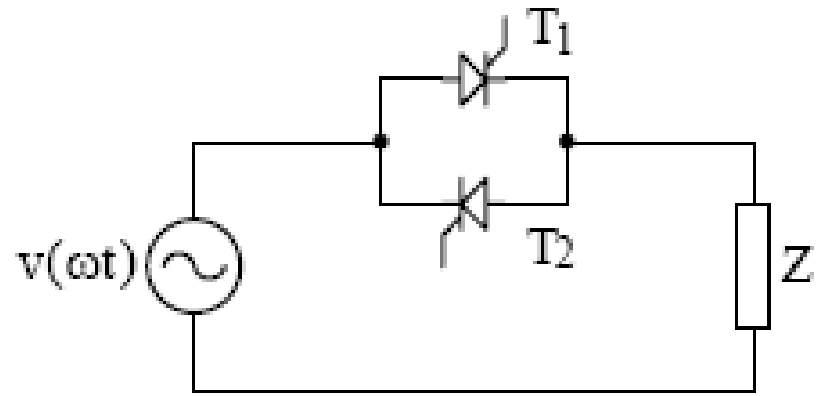
Conversores CA-CA:

- Denominados de choppers: convertem a tensão alternada da rede de energia elétrica em uma tensão alternada com amplitude diferente;
- Podem ser monofásicos, trifásicos ou n-fásicos;
- Bidirecionais;
- Comandados em baixa ou alta frequência
- Com ou sem correção de fator de potência;
- Podem ser isolados ou não-isolados;
- Diretos ou indiretos;
- Podem alterar amplitude, forma e frequência.

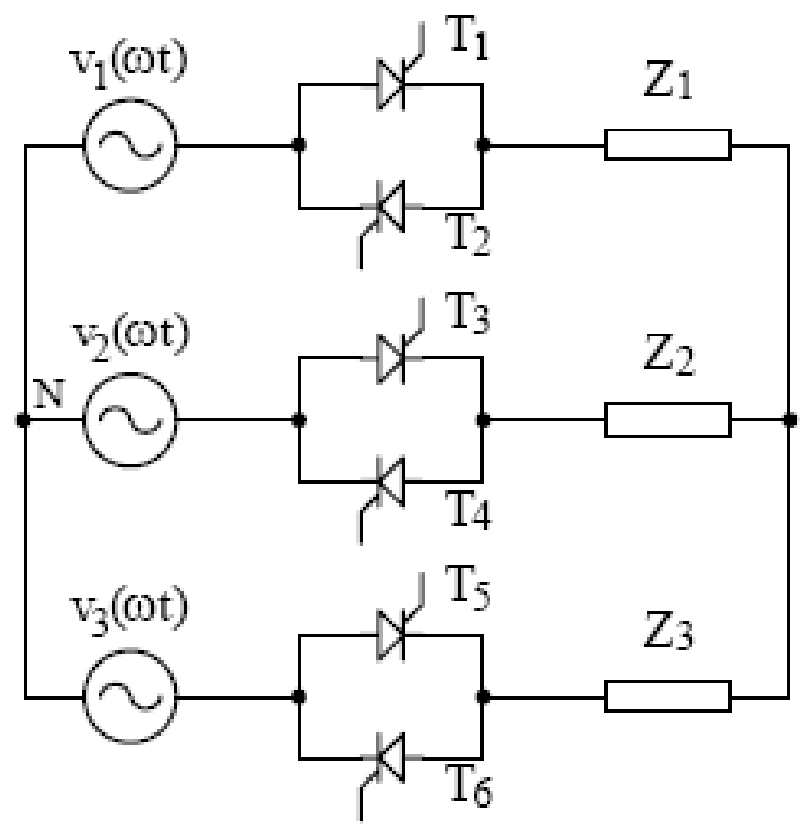
Conversores CA-CA – Princípio geral



Conversores CA-CA – Número de fases

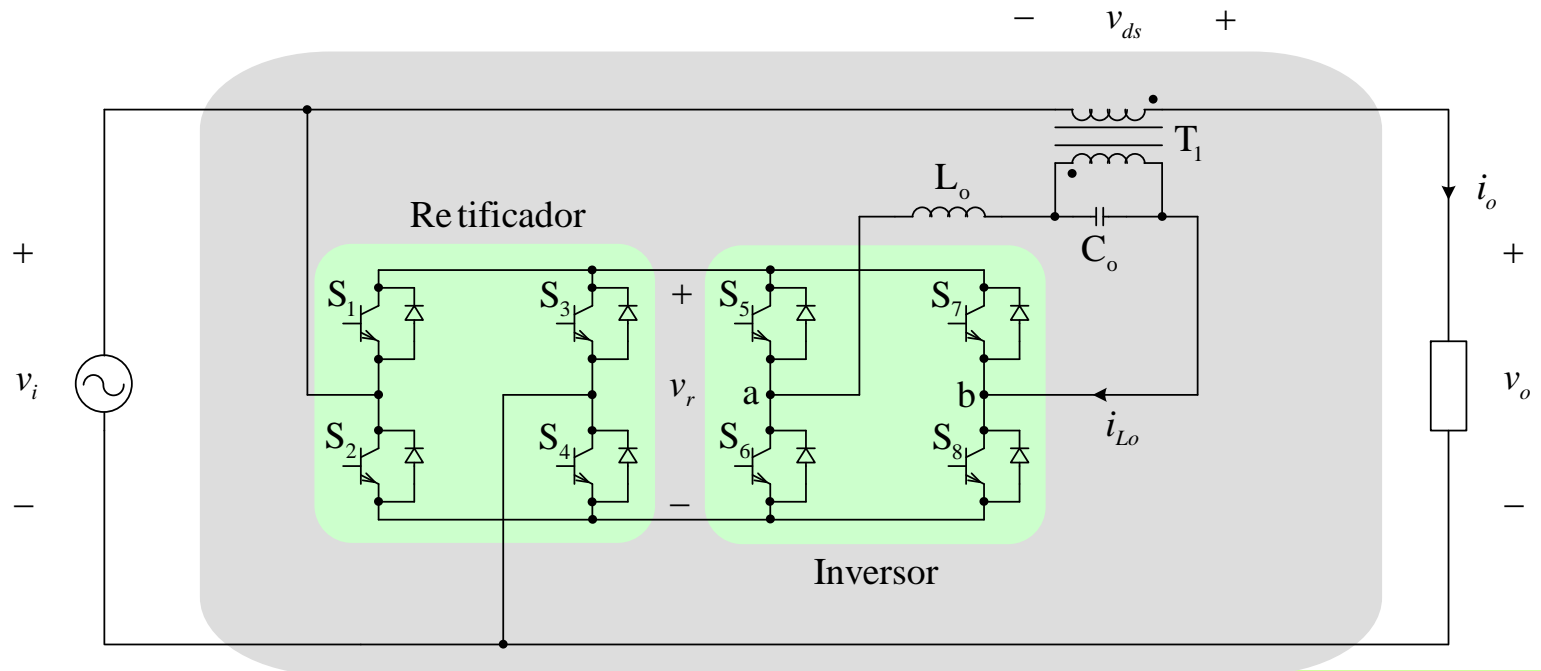
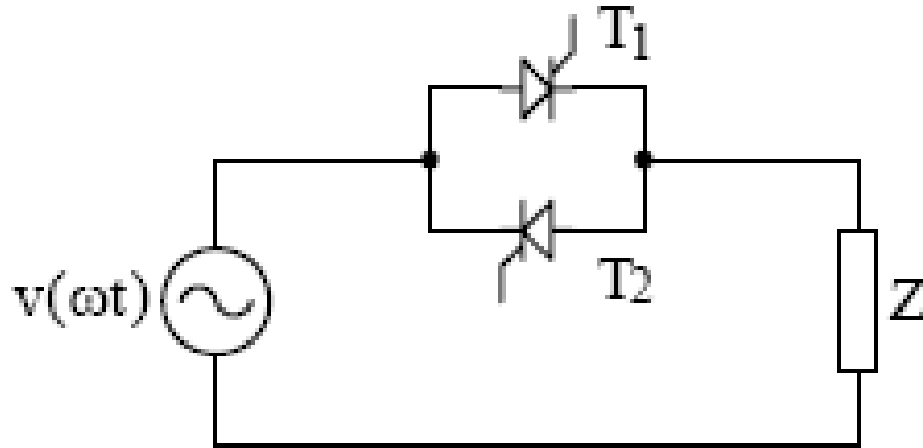


Monofásico

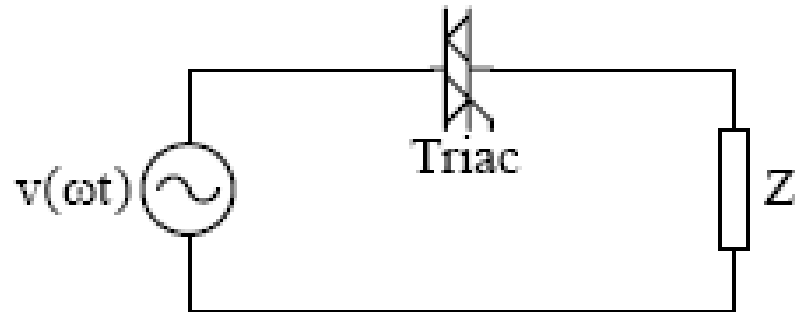


Trifásico

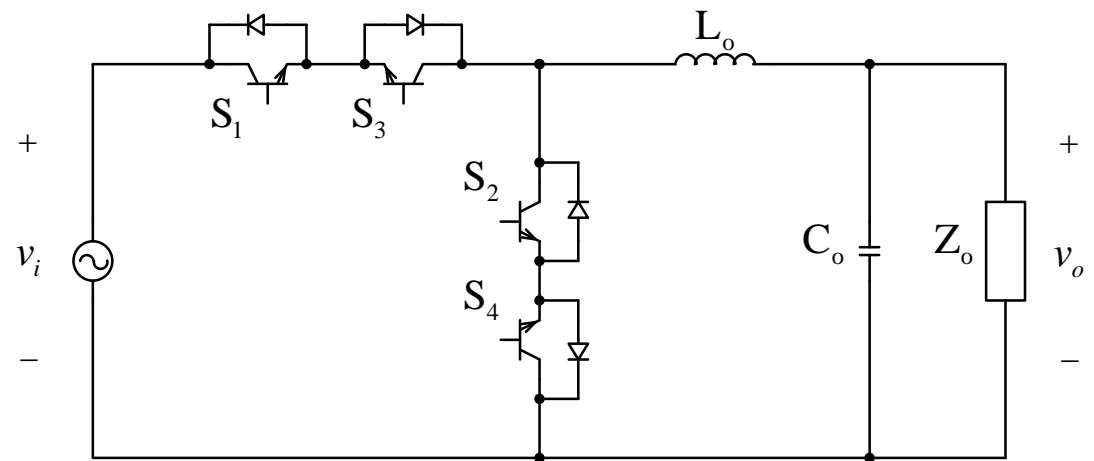
Conversores CA-CA – Direcionalidade



Conversores CA-CA – Comando

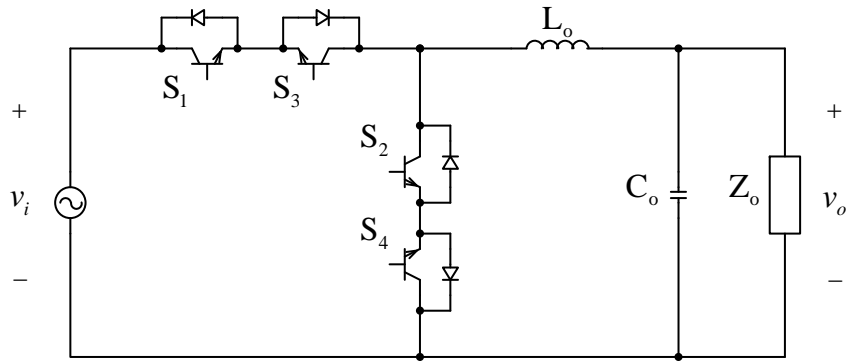


Baixa freqüência

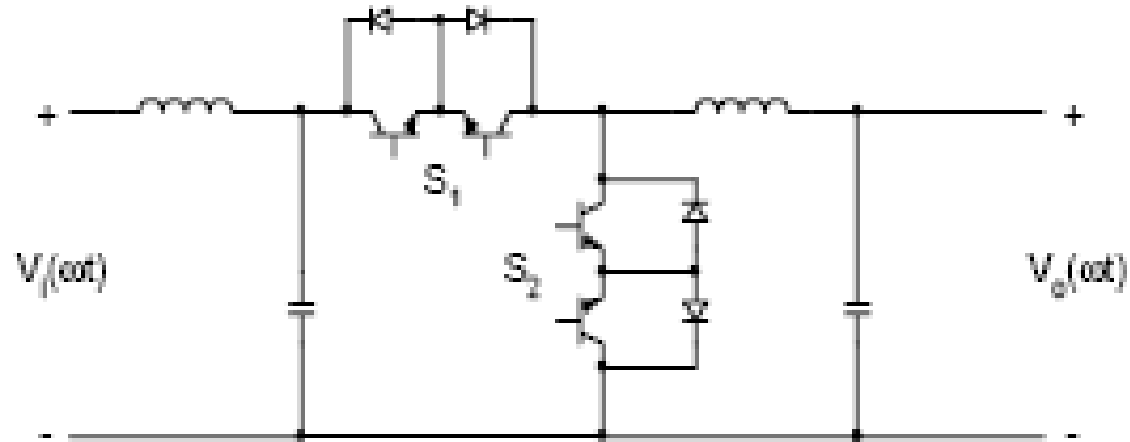


PWM alta freqüência

Conversores CA-CA – Fator de potência



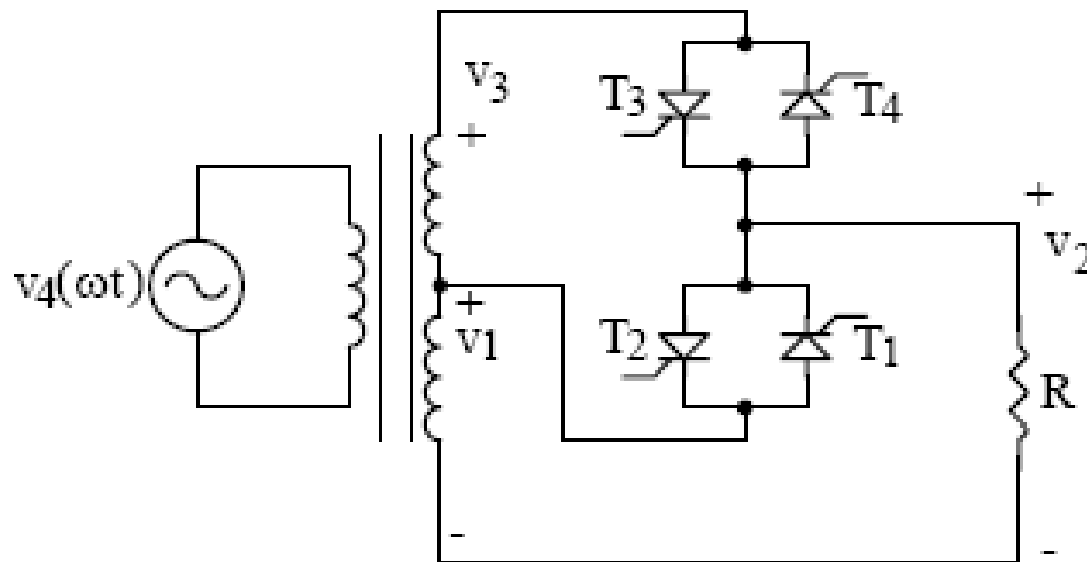
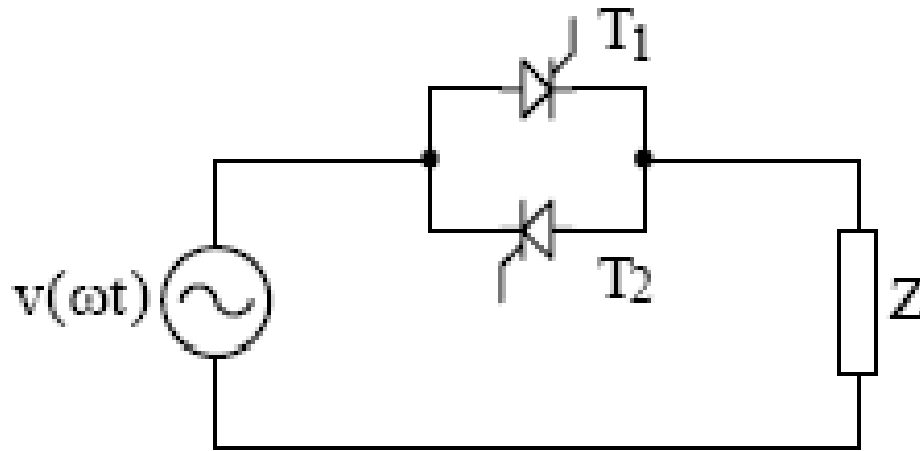
Sem correção



Com correção passiva

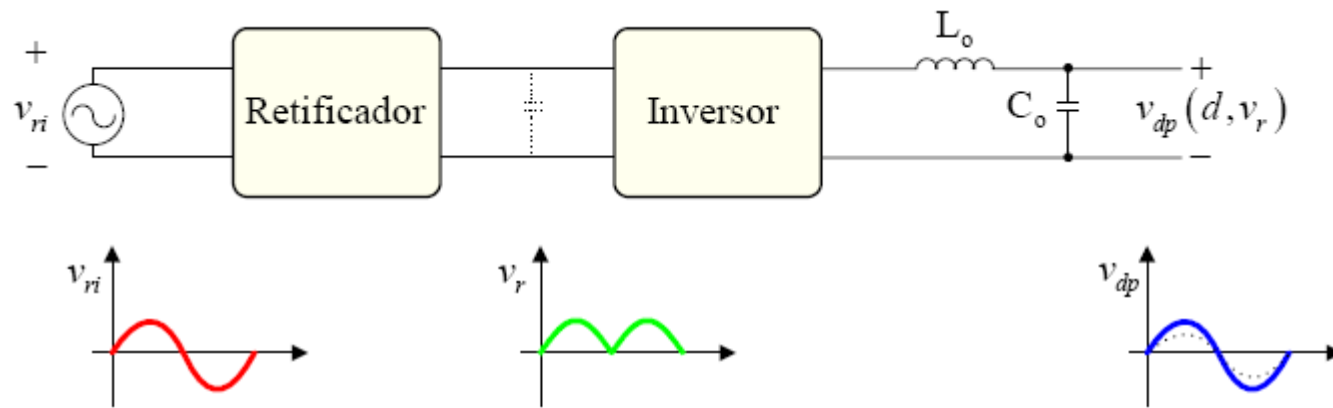
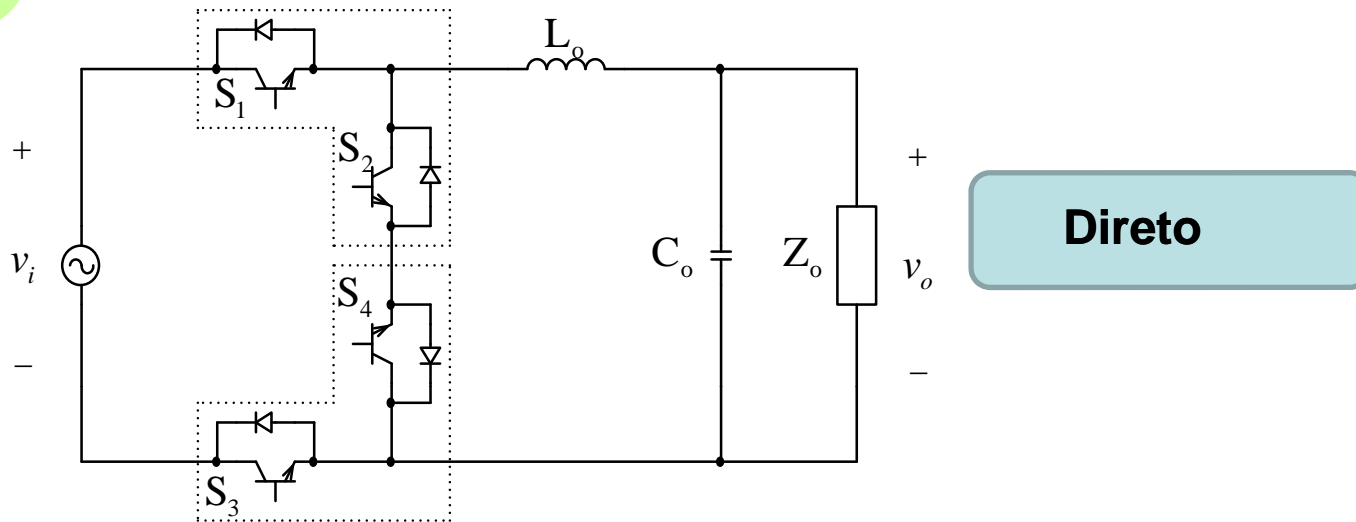
Conversores CA-CA – Isolamento

Não-isolado



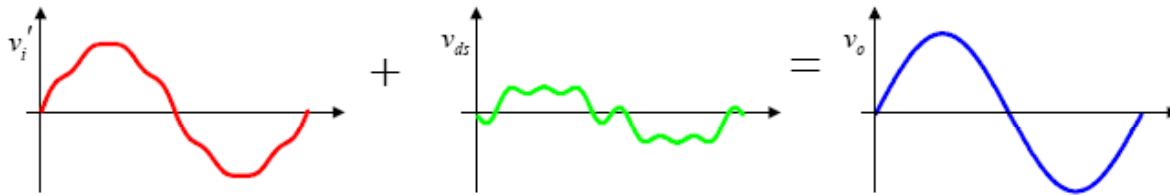
Isolado

Conversores CA-CA – Diretos ou indiretos

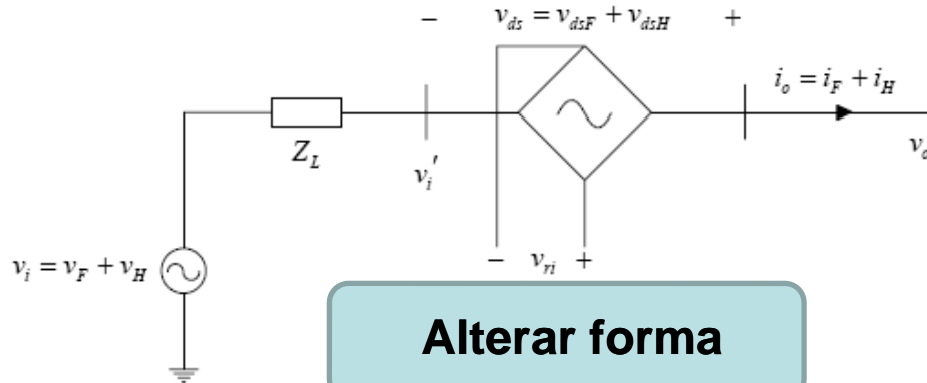


Indireto

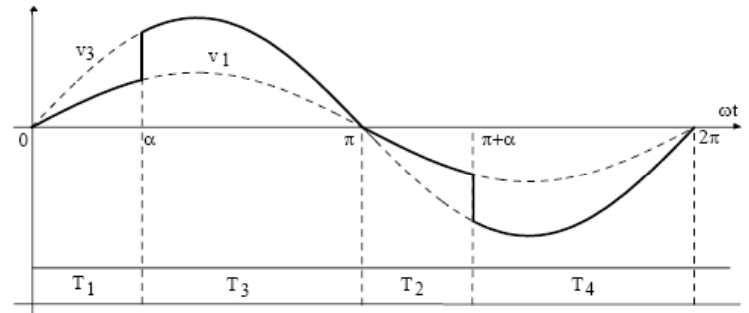
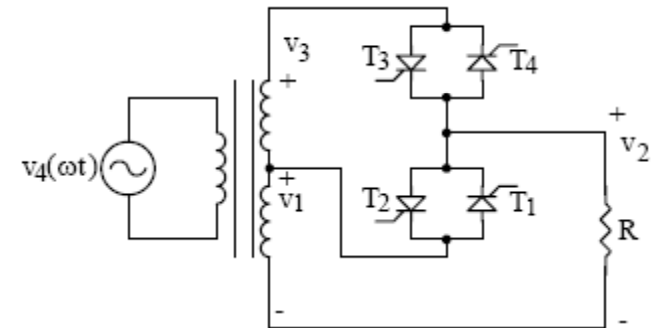
Conversores CA-CA – Função



Alterar amplitude



Alterar forma



Alterar freqüência

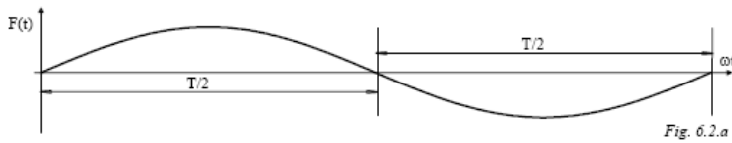


Fig. 6.2.a

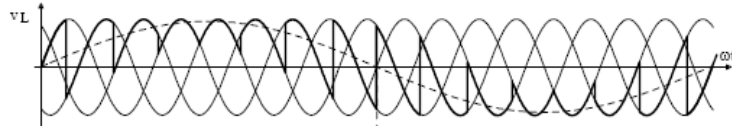


Fig. 6.2.b

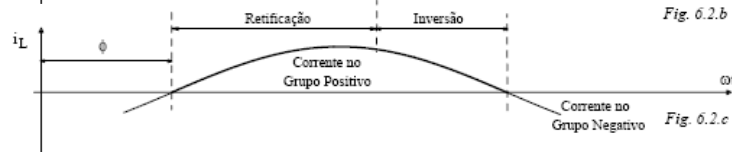
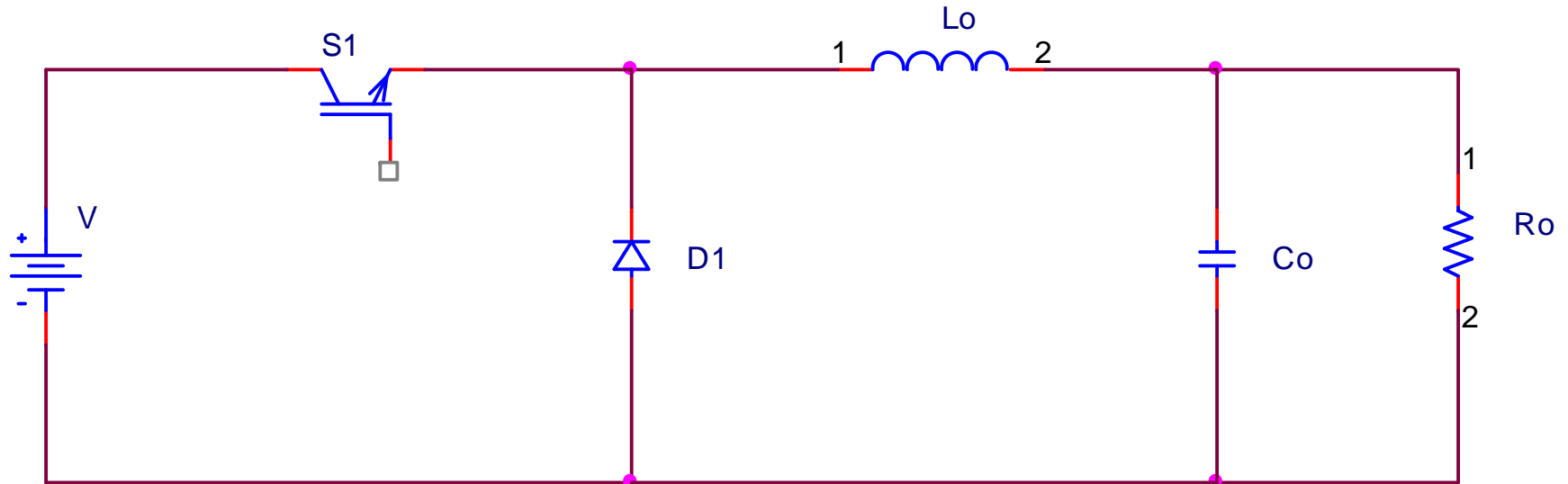


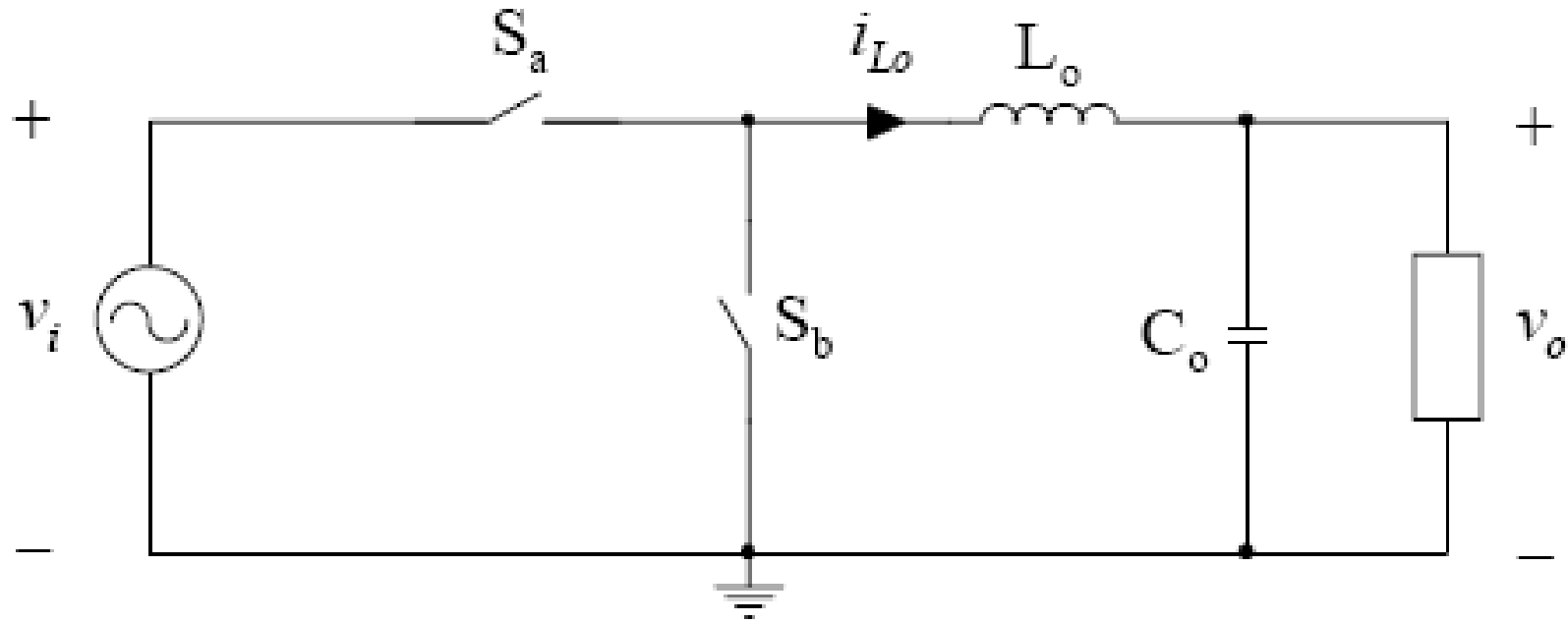
Fig. 6.2.c

Conversores CA-CA – Problema da comutação



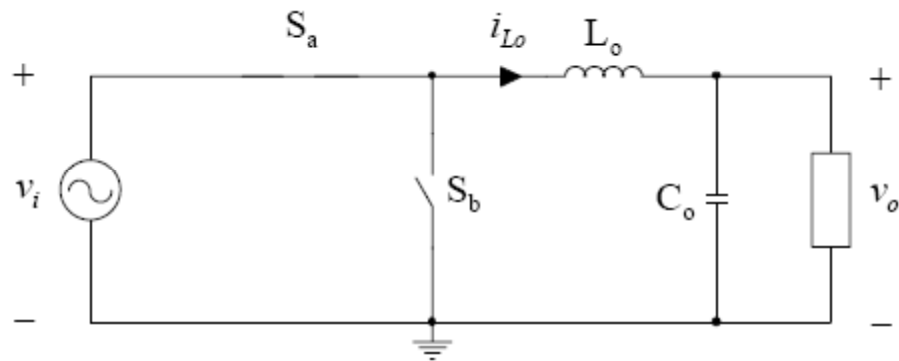
Conversor CC-CC

Conversores CA-CA – Problema da comutação

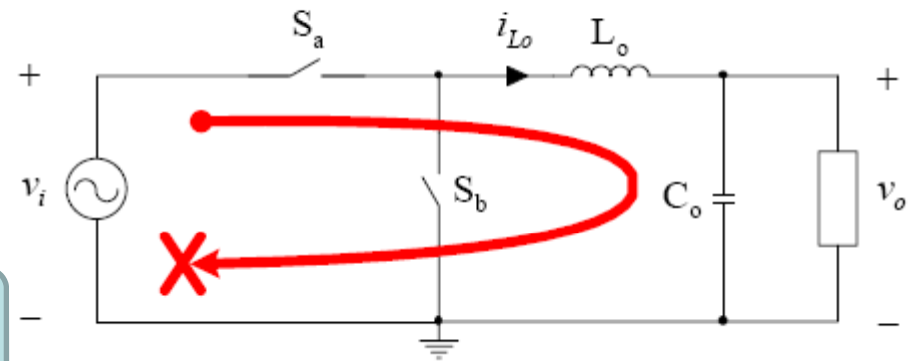
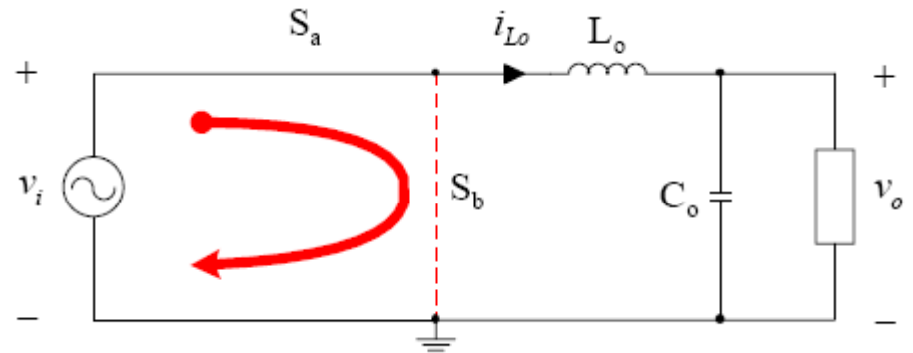
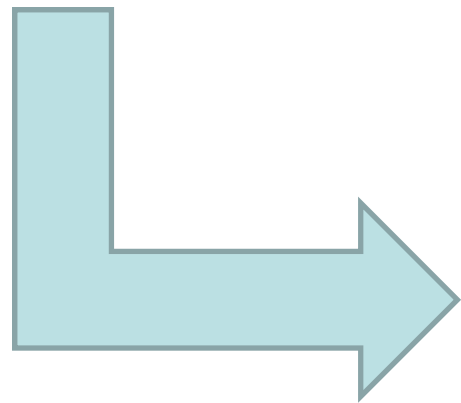


Conversor CA-CA

Conversores CA-CA – Problema da comutação

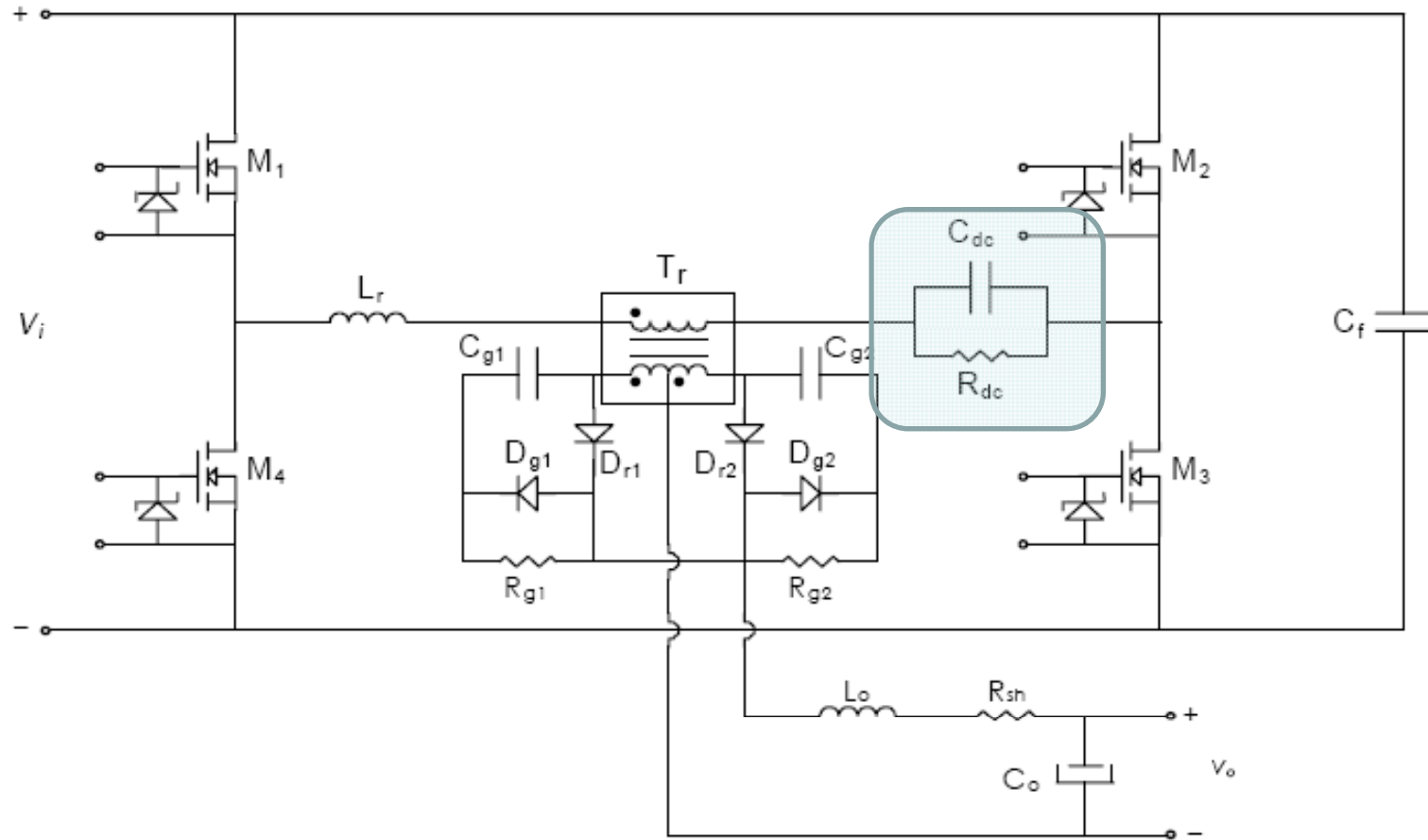


Sobreposição



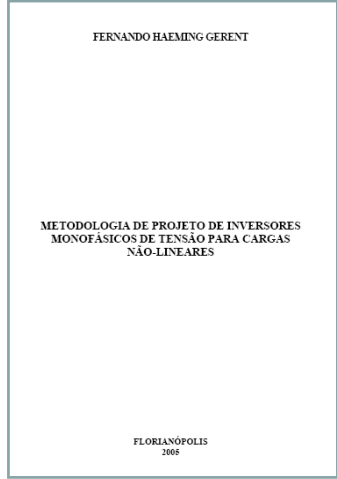
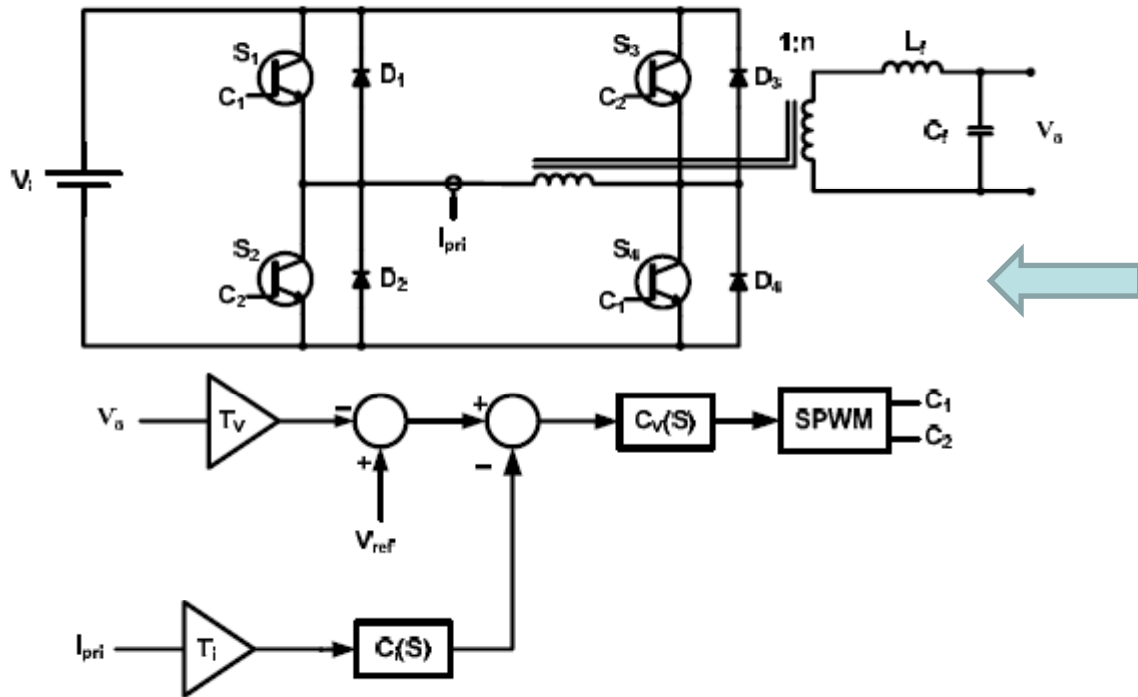
Tempo morto

Conversores CA-CA – Problema do isolamento

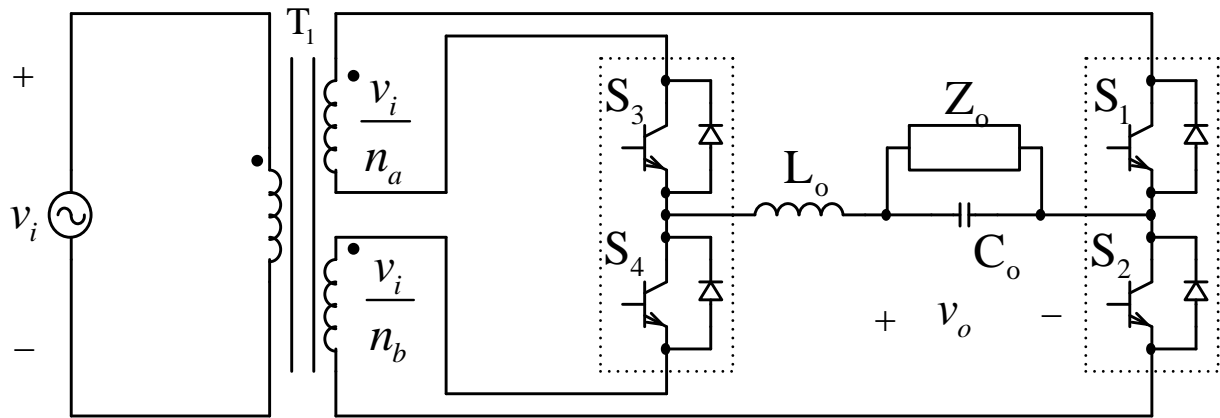


**Isolamento em HF
(> 1 kHz)**

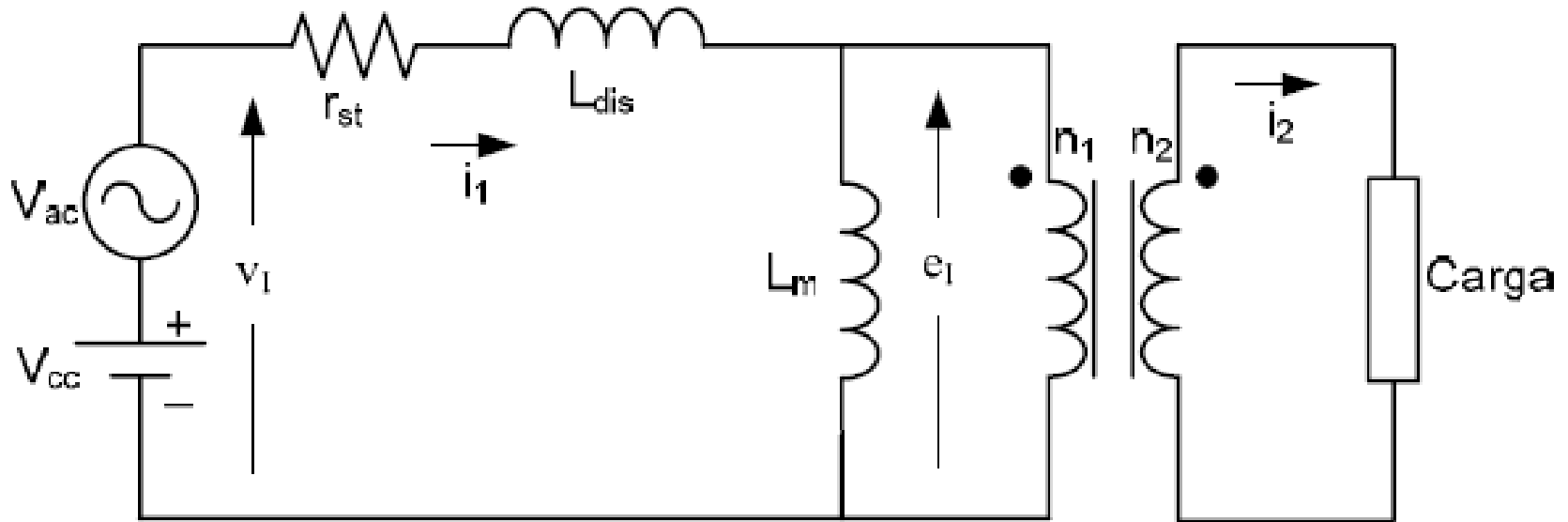
Conversores CA-CA – Problema do isolamento



**Isolamento em BF
(60 ou 120 Hz)**



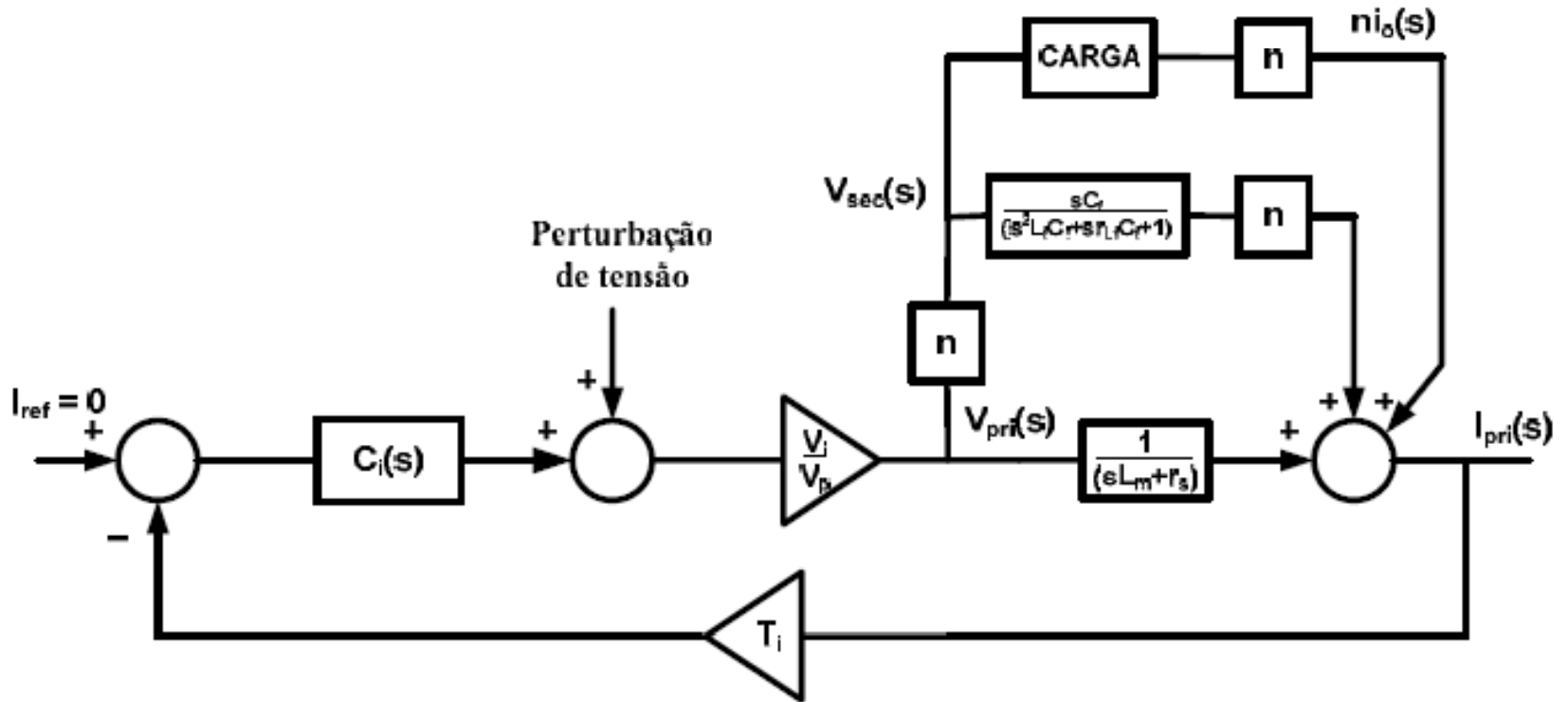
Conversores CA-CA – Problema do isolamento



Circuito equivalente do primário do transformador

$$e_1(t) = n_1 \cdot \frac{d\Phi(t)}{dt}$$

Conversores CA-CA – Problema do isolamento



Solução: empregar uma malha de corrente.

Aplicações dos conversores CA-CA

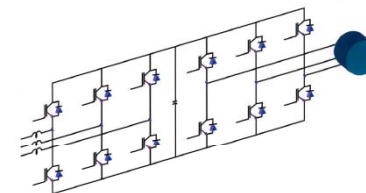
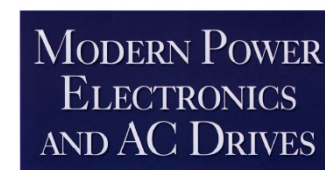
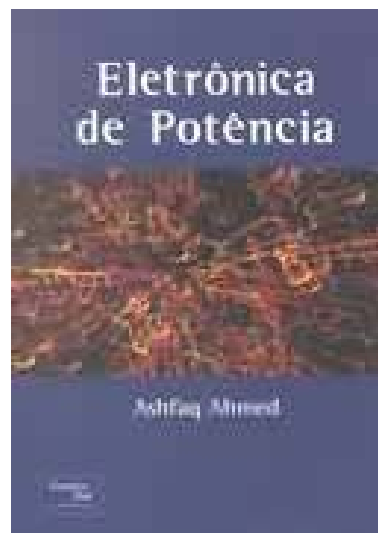
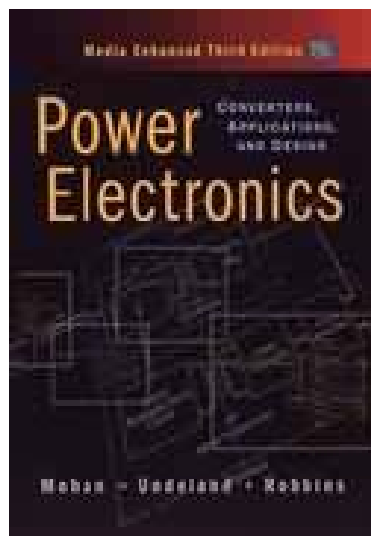
Algumas aplicações:

- Controle de intensidade luminosa;
- Controle de temperatura;
- Controle de velocidade de motores de indução;
- Limitação da corrente de partida de motores de indução;
- Estabilizadores de tensão;
- Filtros ativos;
- Pré-estabilização em fontes de alimentação e UPS;
- Economia de energia;
- Sistemas de potência;
- Entre outras.

Próxima aula

Conversores CA-CA:

1. Semicondutores aplicados a conversores CA-CA (IGBTs).



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