

Retificadores Monofásicos não controlados comutados pela rede

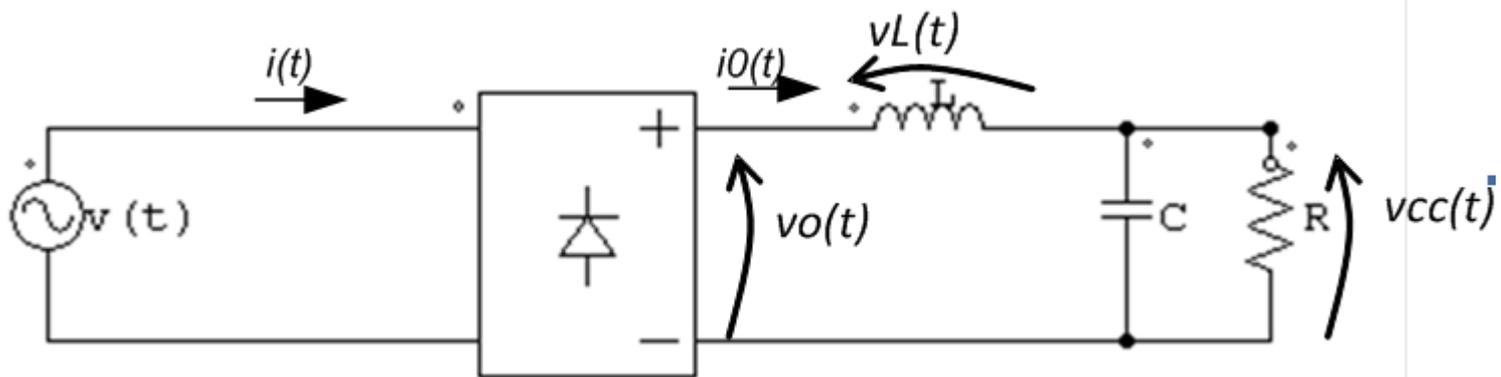
Influência dos filtros CC e da
indutância do lado CA

Retificadores Simples (lousa)

- Retificador de 1 caminho
- Retificador de 2 caminhos com carga resistiva
- Retificador de 2 caminhos com filtro C
 - Problema: correntes distorcidas e FP baixo!!!
- Retificador de 2 caminhos com filtro L
 - Vamos ver como melhora a corrente!!!

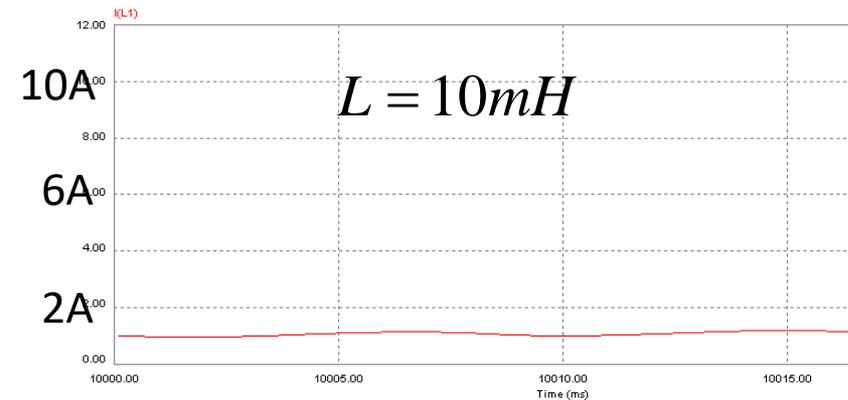
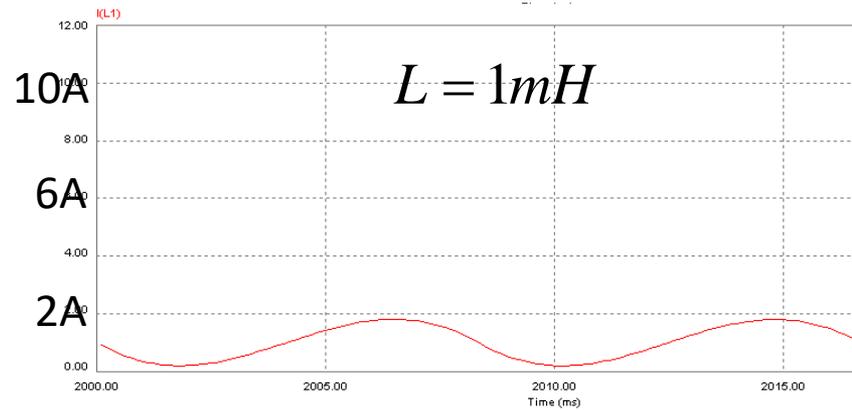
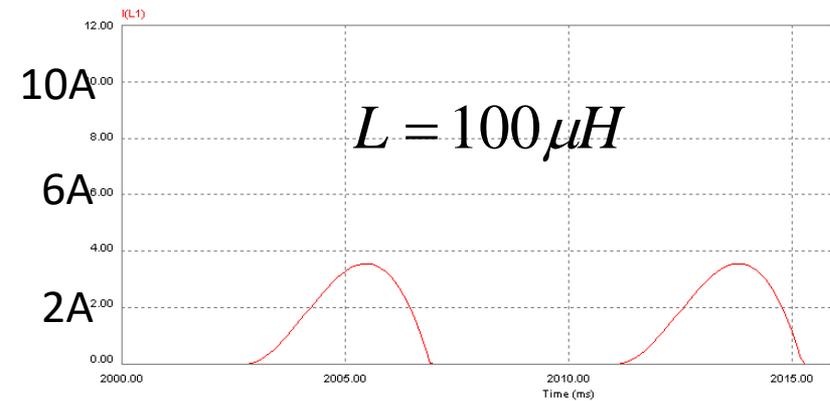
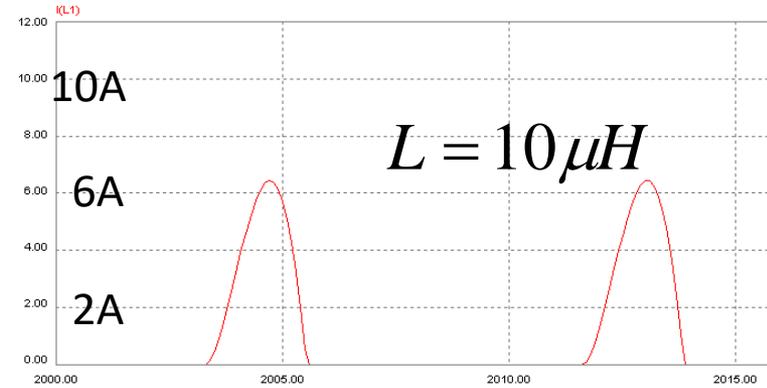
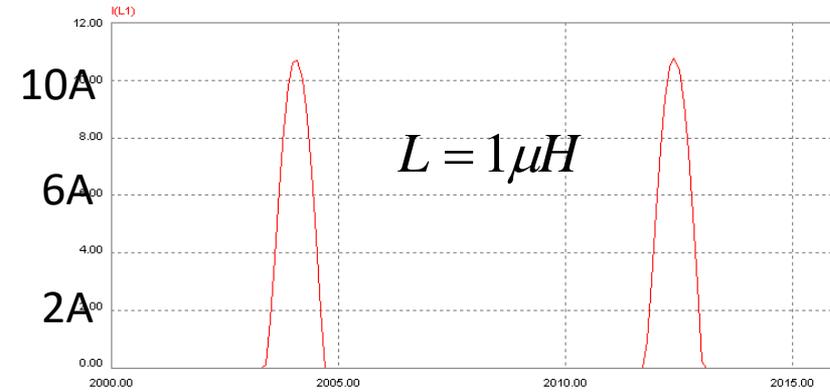
Inclusão de Indutor de filtro

- Indutor não deixa a corrente variar rapidamente limita di/dt



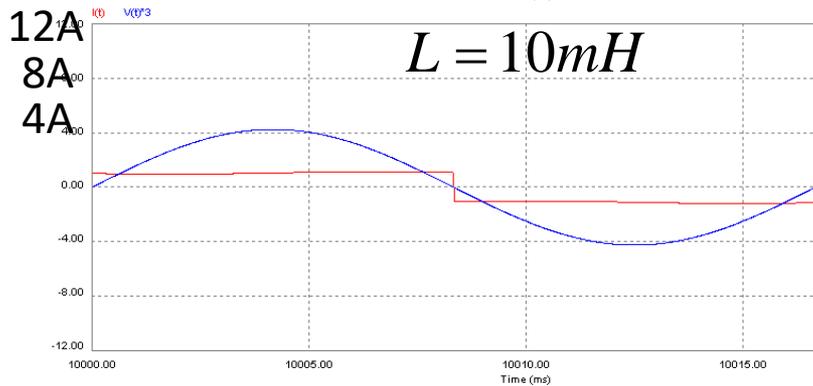
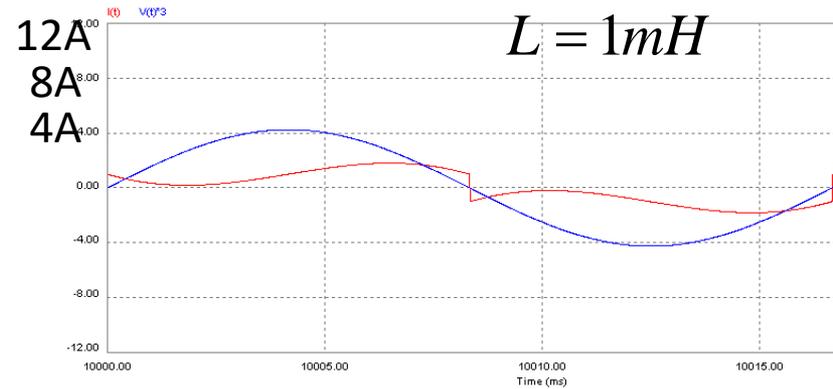
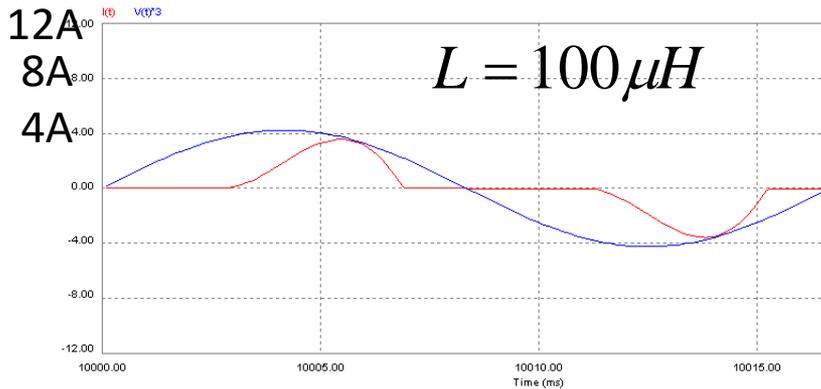
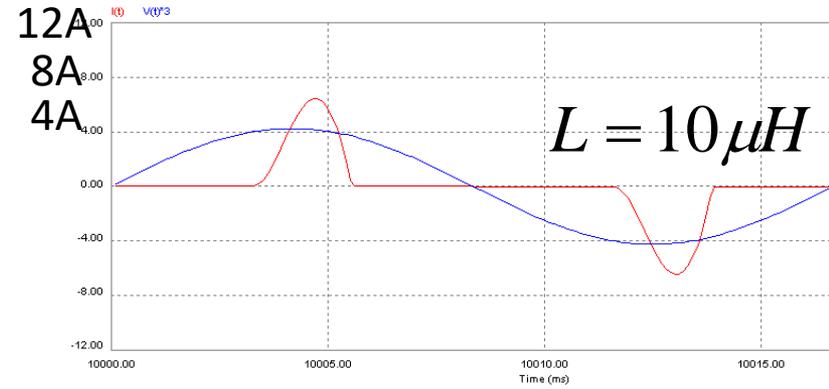
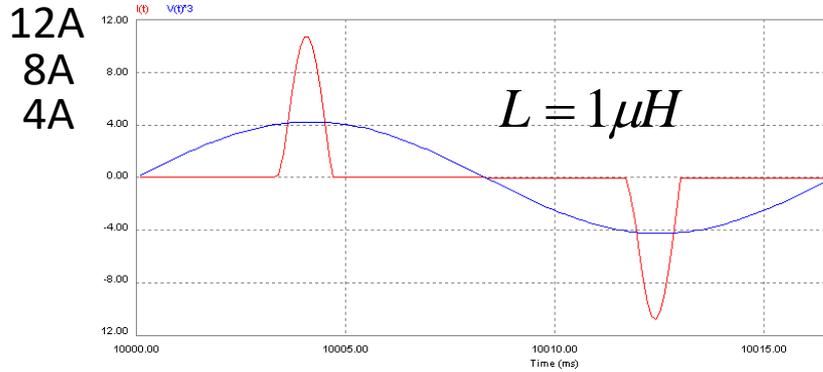
Inclusão de Indutor de filtro

Formas de onda: corrente CC ($i_o(t)$)



Inclusão de Indutor de filtro

Formas de onda: corrente CA ($i(t)$)



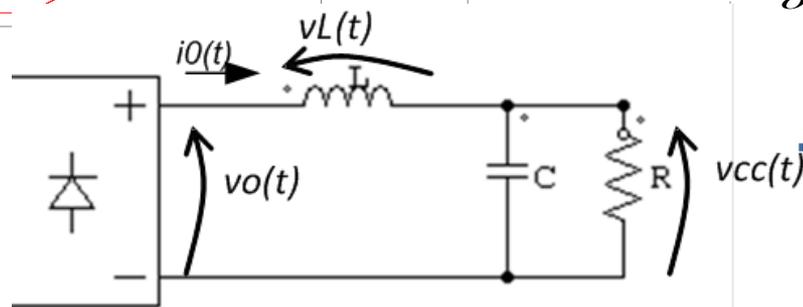
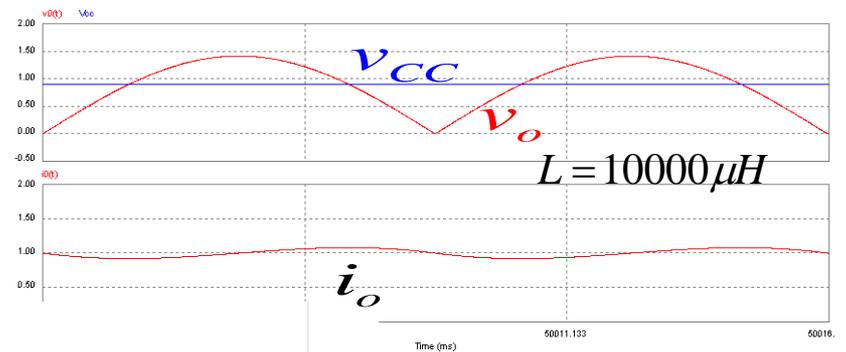
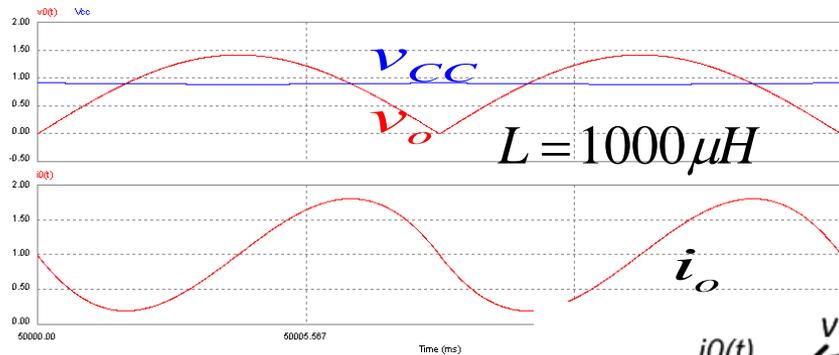
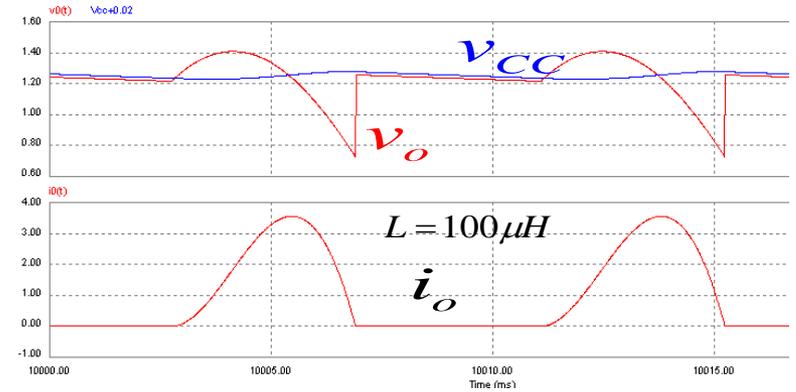
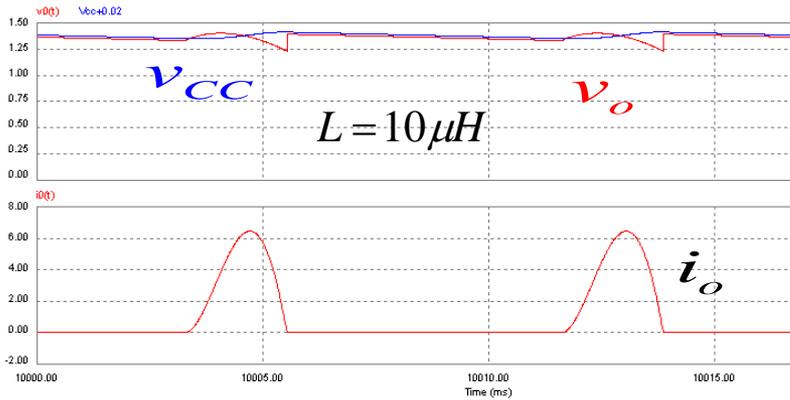
Inclusão de Indutor de filtro

Comportamento de I_{ef} , P_{CA} , FP, $V_{CC_média}$
com a variação de L

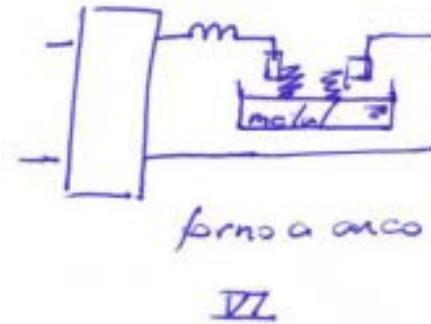
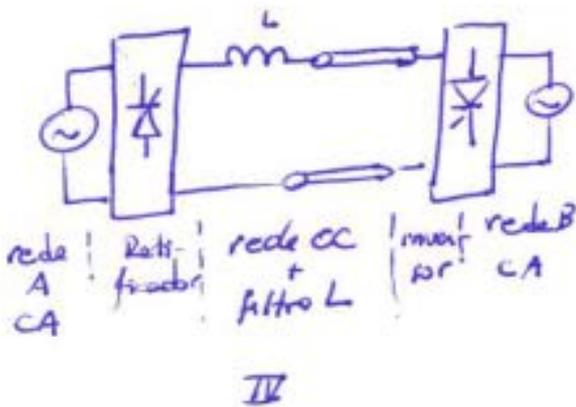
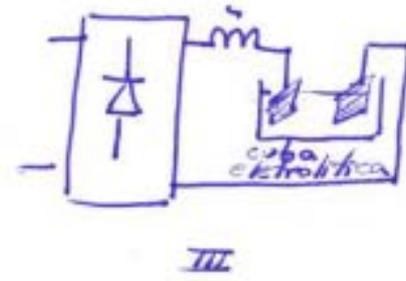
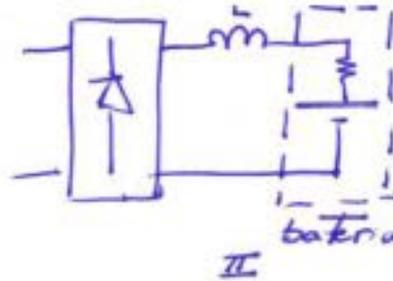
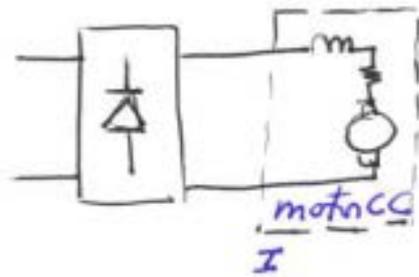
L (μH)	1	10	100	1000	10000
I_{ef} (A)	2,88	2,23	1,65	1,15	1,00
P_{CA} (W)	1,41	1,37	1,24	0,902	0,900
$FP = \frac{P_{CA}}{V_{ef} I_{ef}}$	0,486	0,613	0,747	0,778	0,900
$V_{CC_média}$ (V)	1,38	1,36	1,23	0,897	0,900

Inclusão de Indutor de filtro

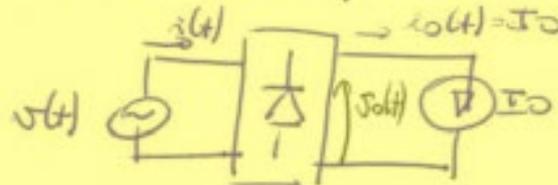
Formas de onda: corrente CA ($i(t)$)



Casos práticos com indutor na saída

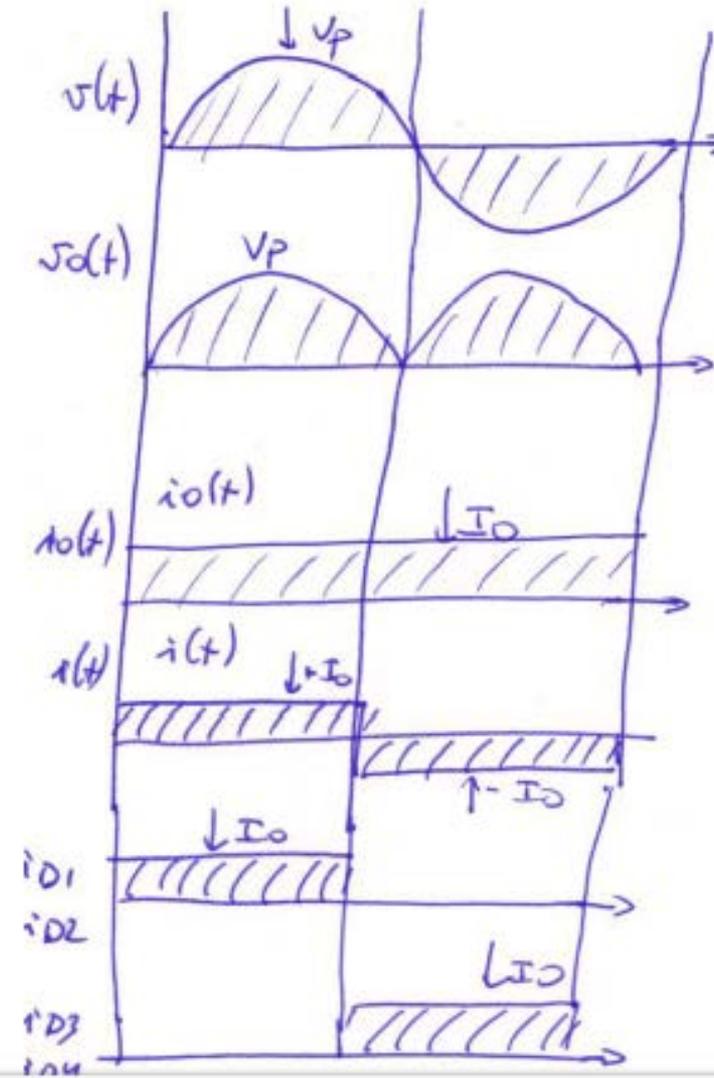


se $i_o(t) \approx cte = I_o$, todos são modelados por:

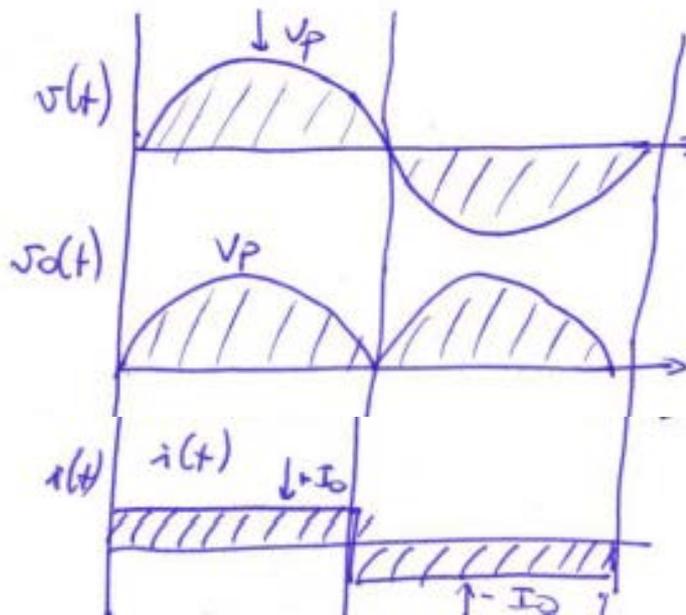


VII - modelo simplificado

Formas de onda para $I_o = \text{cte}$ Indutor de filtro com valor elevado



Análise do caso $I_0 = \text{cte}$ (Indutor de filtro com valor elevado)



$$: V_{0\text{medio}} = \frac{2}{\pi} V_{\text{pico}} =$$

$$I_{\text{ef}} = I_0$$

$$i(t) = \frac{4I_0}{\pi} \left(1 \text{sen}(\omega t) + \frac{1}{3} \text{sen}(3\omega t) + \frac{1}{5} \text{sen}(5\omega t) + \dots \dots \dots \frac{1}{h} \text{sen}(h\omega t) \right)$$

$$P_{\text{CC}} = \frac{1}{T} \int_0^T v_0(t) i_0(t) dt = \frac{1}{T} \int_0^T v_0(t) I_0 dt = I_0 \frac{1}{T} \int_0^T v_0(t) dt = I_0 V_{0\text{medio}}$$

Análise do caso $I_0 = \text{cte}$ (Indutor de filtro com valor elevado)

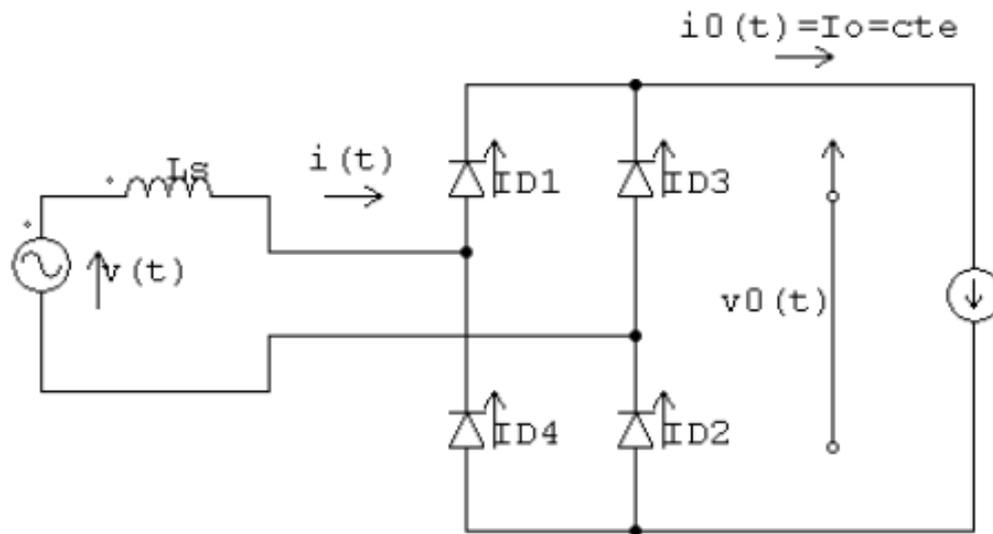
A potencia aparente é definida por:

$$S = V_{ef} I_{ef} = \frac{V_p}{\sqrt{2}} I_0$$

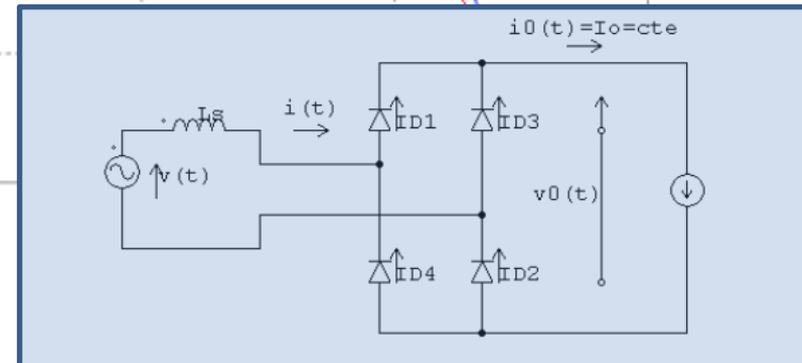
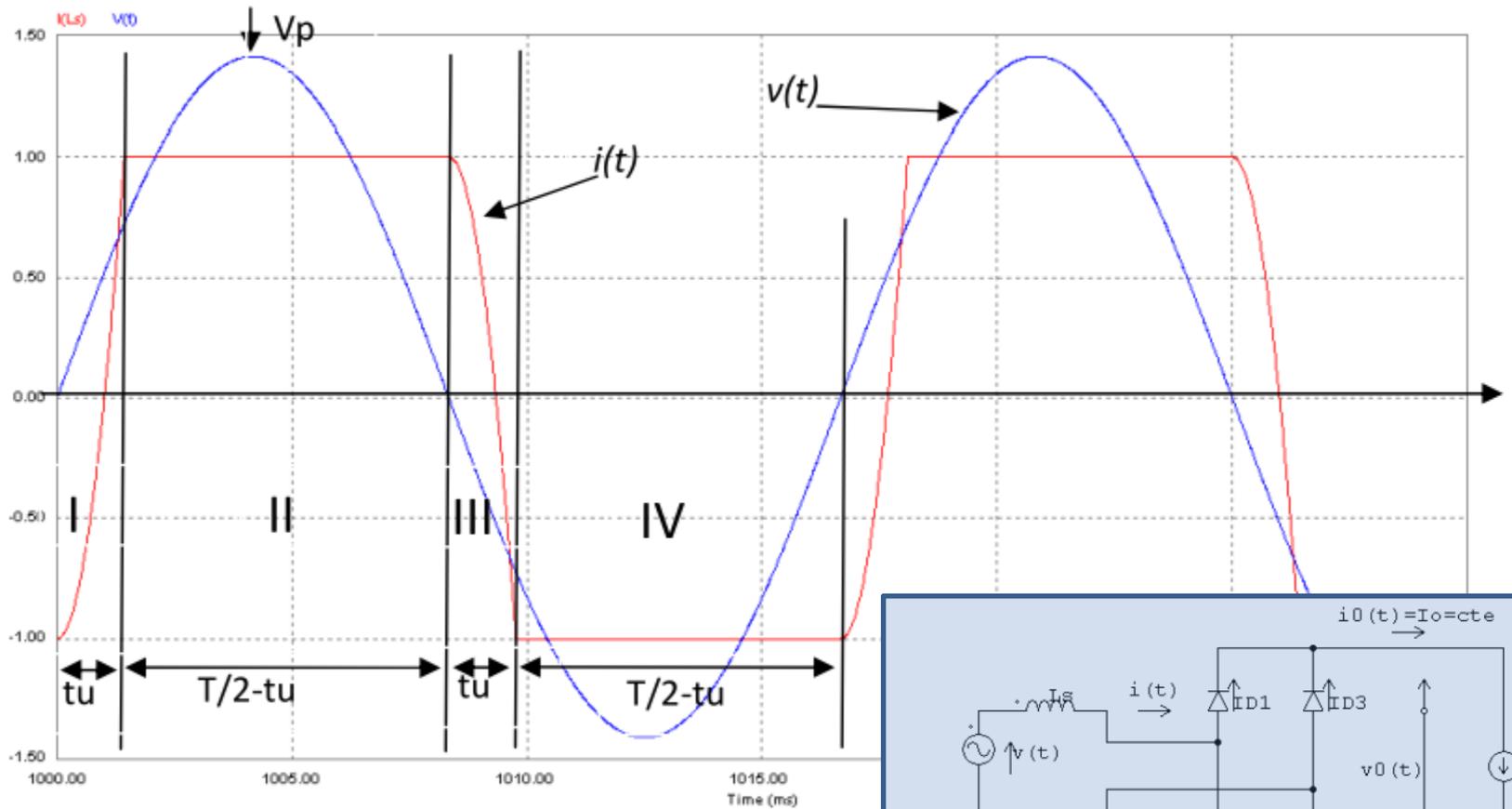
O fator de potencia é dado por:

$$FP = \frac{P}{S} = \frac{V_{0\text{ medio}} I_0}{(V_p / \sqrt{2}) I_0} = \frac{2V_p / \pi}{(V_p / \sqrt{2})} = 0.9$$

Caso $i_o = \text{cte}$ e rede com indutancia $L_s \neq 0$



Formas de onda para $I_o = cte$ rede com indutancia da rede $L_s \neq 0$



Formas de onda para $I_o = \text{cte}$ rede com indutancia da rede $L_s \neq 0$

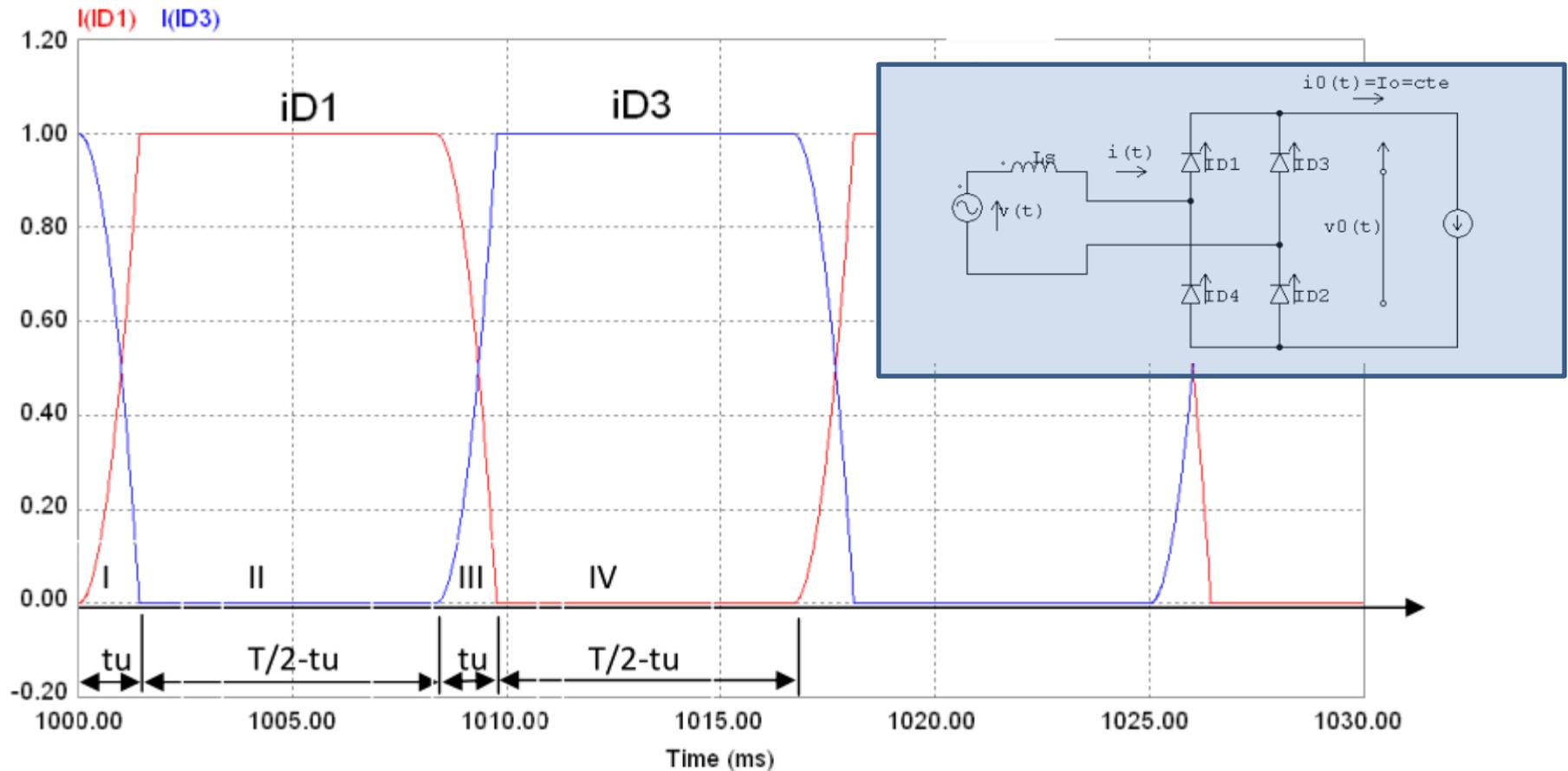


figura 2.1.4c corrente nos diodos D1 e D3

Formas de onda para $I_o = cte$ rede com indutancia da rede $L_s \neq 0$

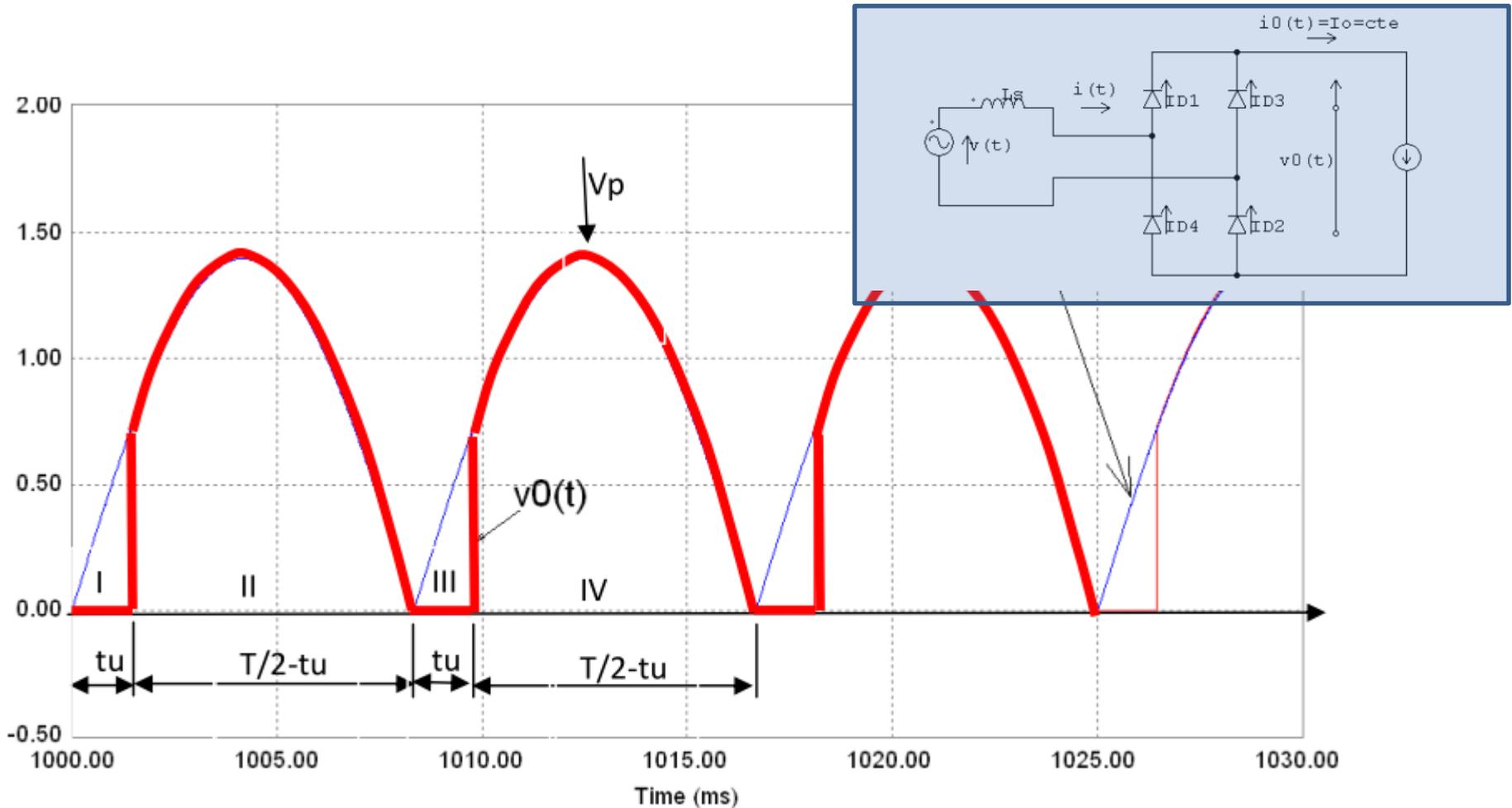


figura 2.1.4d tensão $v_0(t)$

Formas de onda para $I_o = cte$ rede com indutancia da rede $L_s \neq 0$

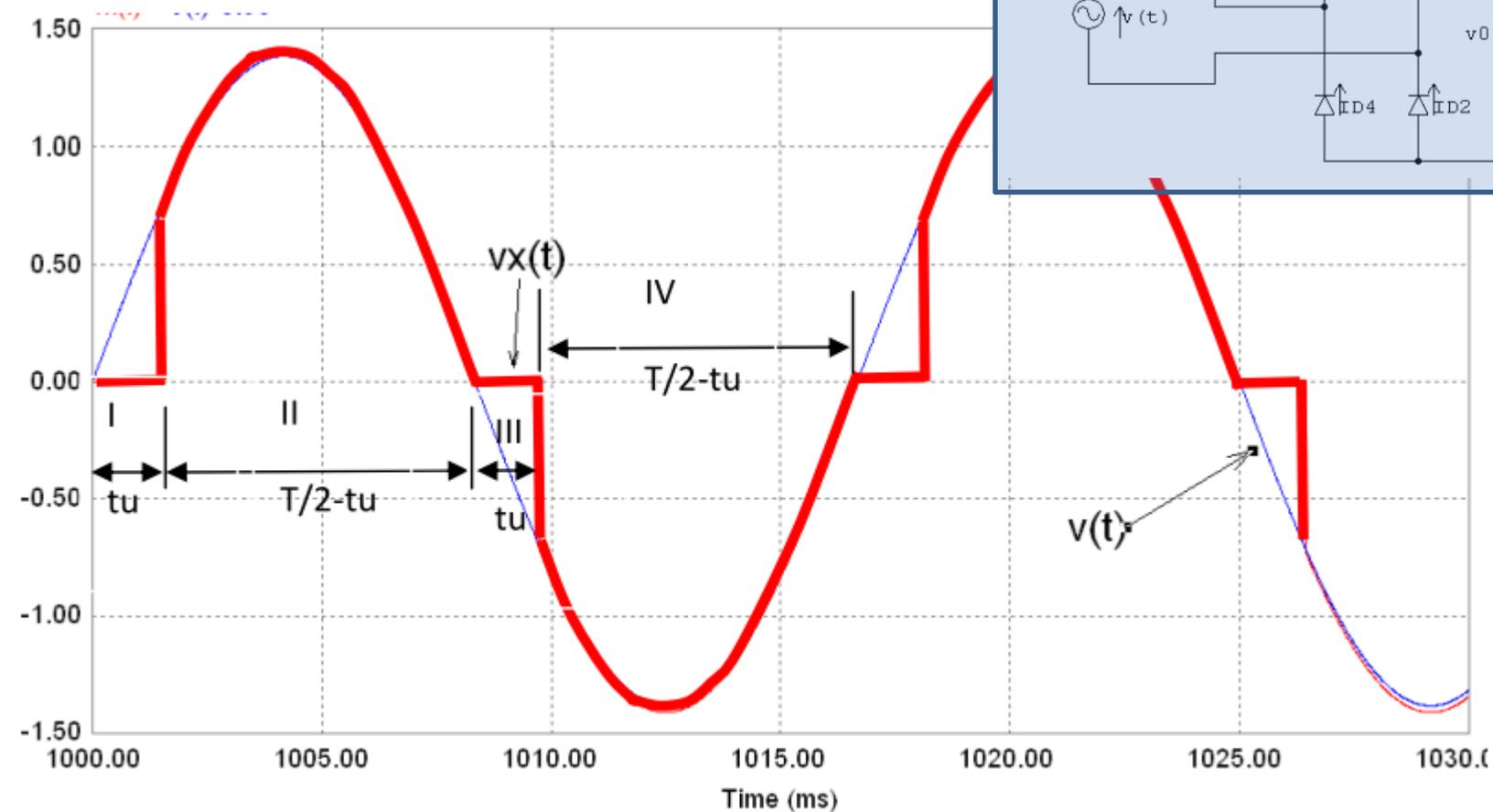
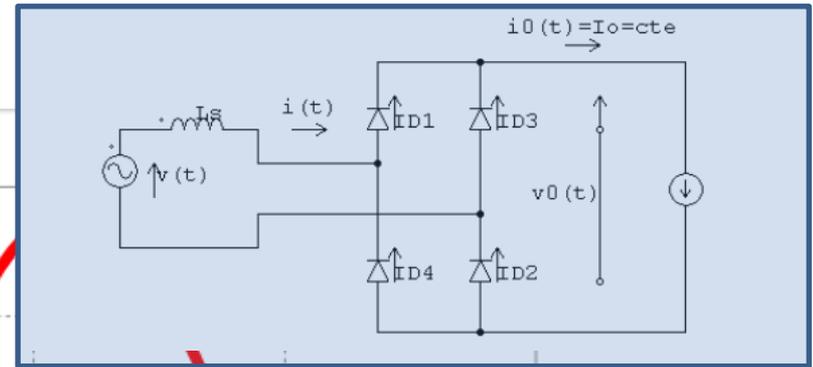
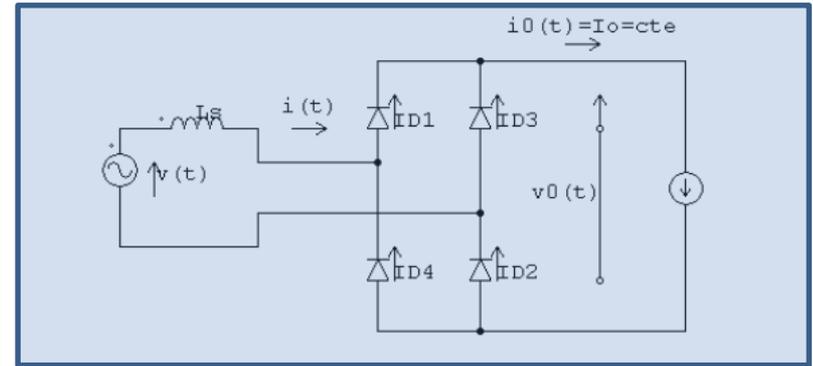
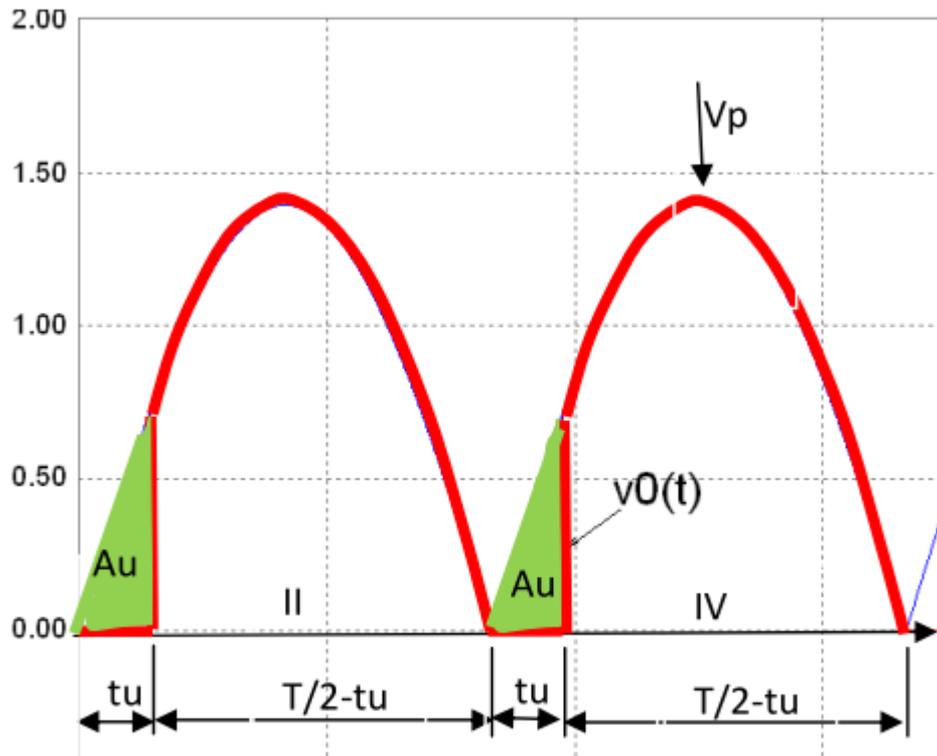


figura 2.1.4e tensão $v_x(t)$

Formas de onda para $I_o = cte$ rede com indutancia da rede $L_s \neq 0$



$$V_{0\text{medio}} = \frac{A - A_u}{T/2}$$

figura 2.1.4f tensão $v_0(t)$ e área perdida A_u

$$V_{0\text{medio}} = \frac{2V_p}{\pi} - \frac{2L_s I_0}{T/2} = \frac{2V_p}{\pi} - \frac{2\omega L_s I_0}{\pi}$$