

LABORATÓRIO DE CIRCUITOS ELÉTRICOS

Experiência 7 Redes de 1ª Ordem

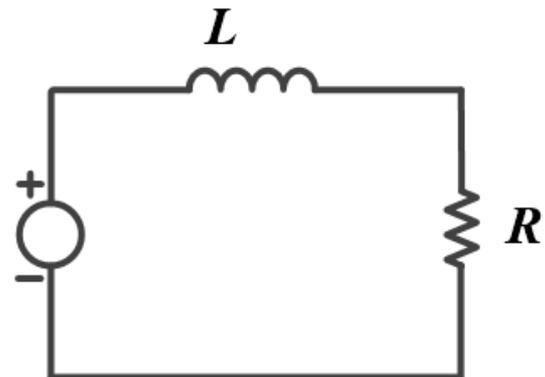
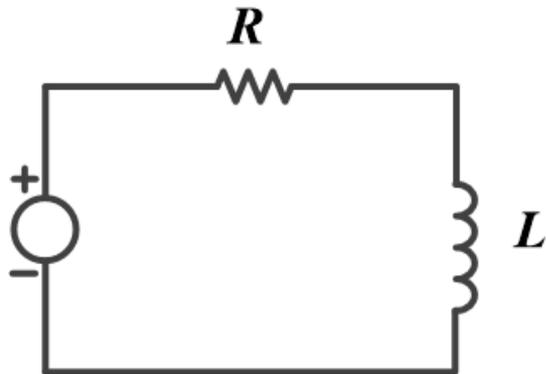
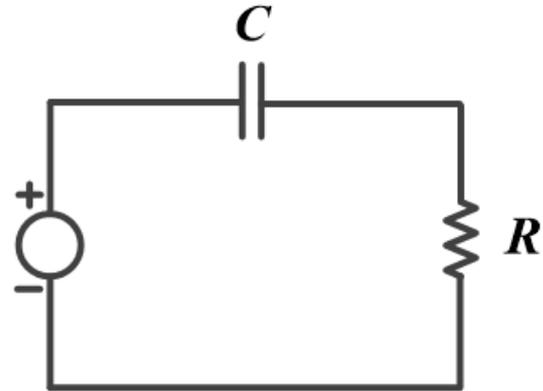
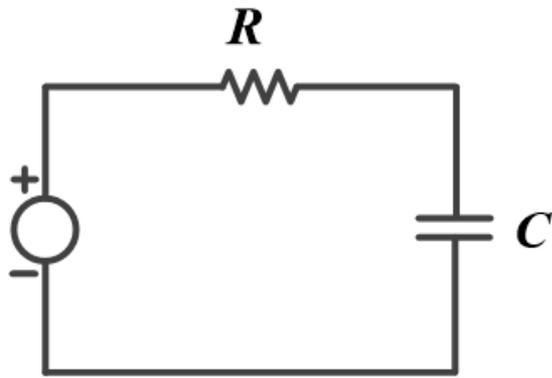
Aula online – 15/06/2021

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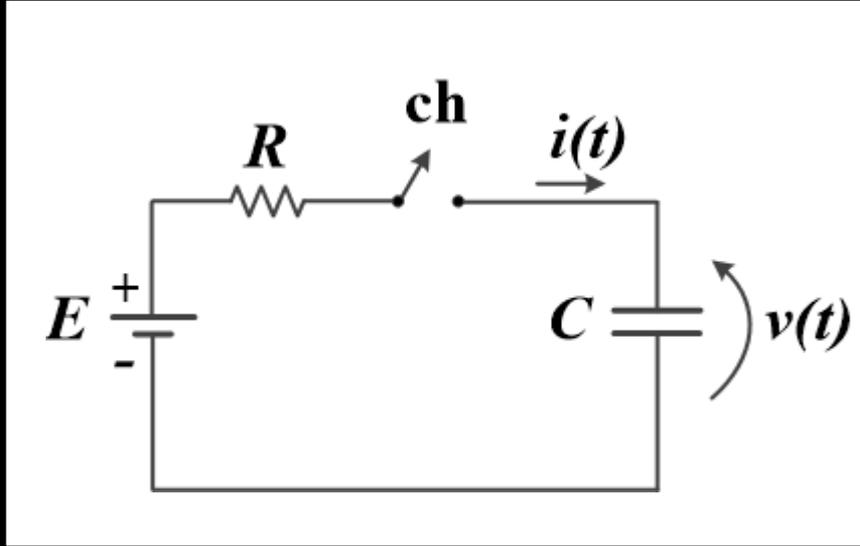
Objetivos

1. Analisar o comportamento de circuito RC e RL no domínio de tempo
 - Constante do tempo
 - Resposta permanente e transitória
1. Aplicar circuito RC e AmpOp para construir um oscilador de onda quadrada

1. Rede de 1ª ordem



2. Comportamento do Circuito RC



Condição Inicial:

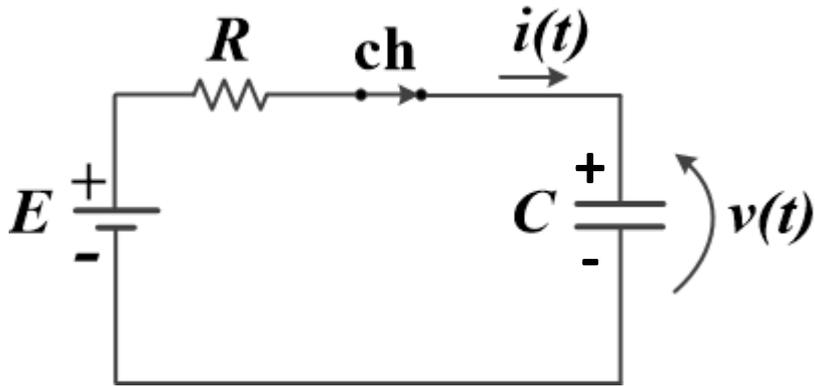
$$v = 0 ; i = 0$$

Vamos fechar a chave
no instante $t = 0$

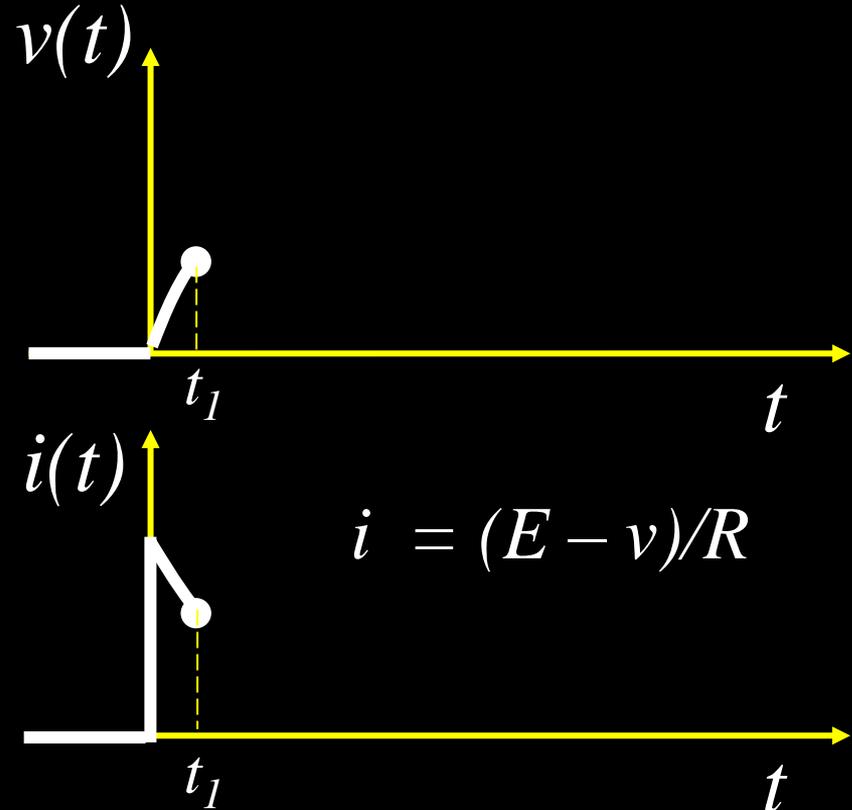
O que vai acontecer
com $v(t)$ e $i(t)$?

2.2 Comportamento em $t = t_1$

Fig. 1

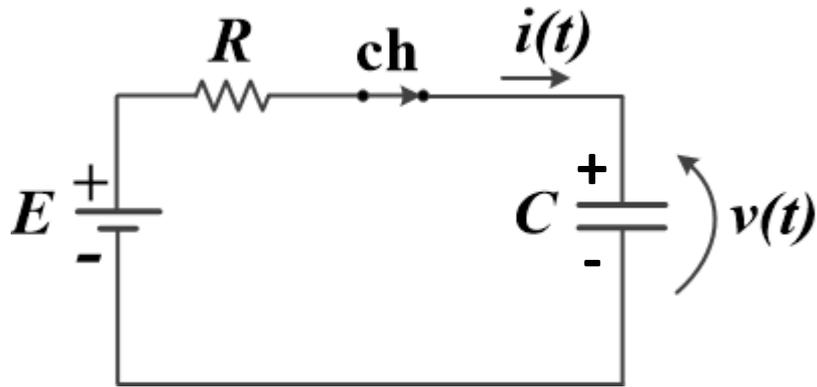


$$v = 0 ; i = 0 \quad (t < 0)$$

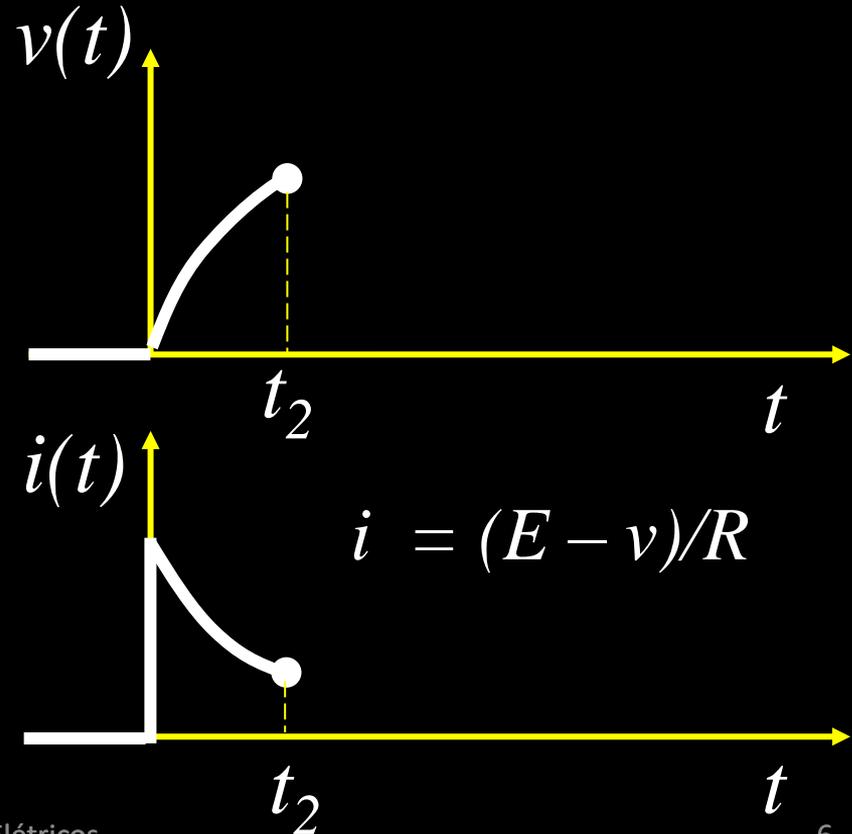


2.3 Comportamento em $t = t_2$

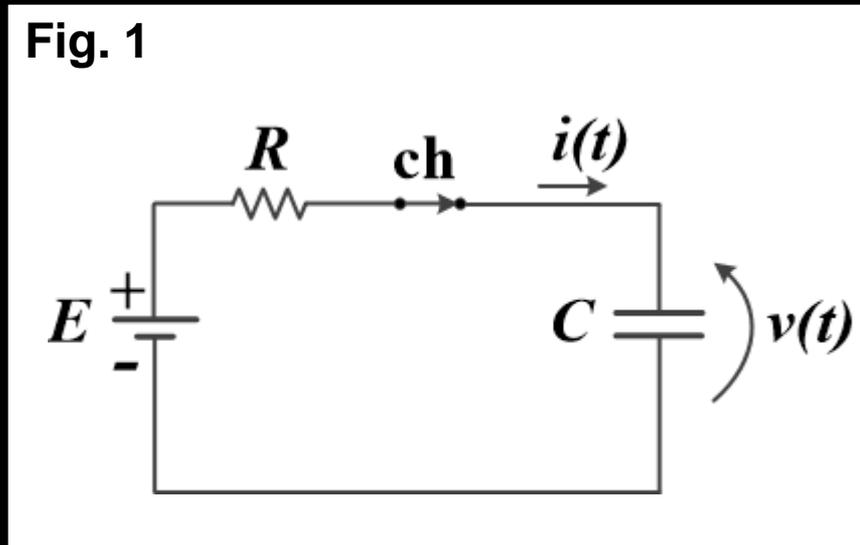
Fig. 1



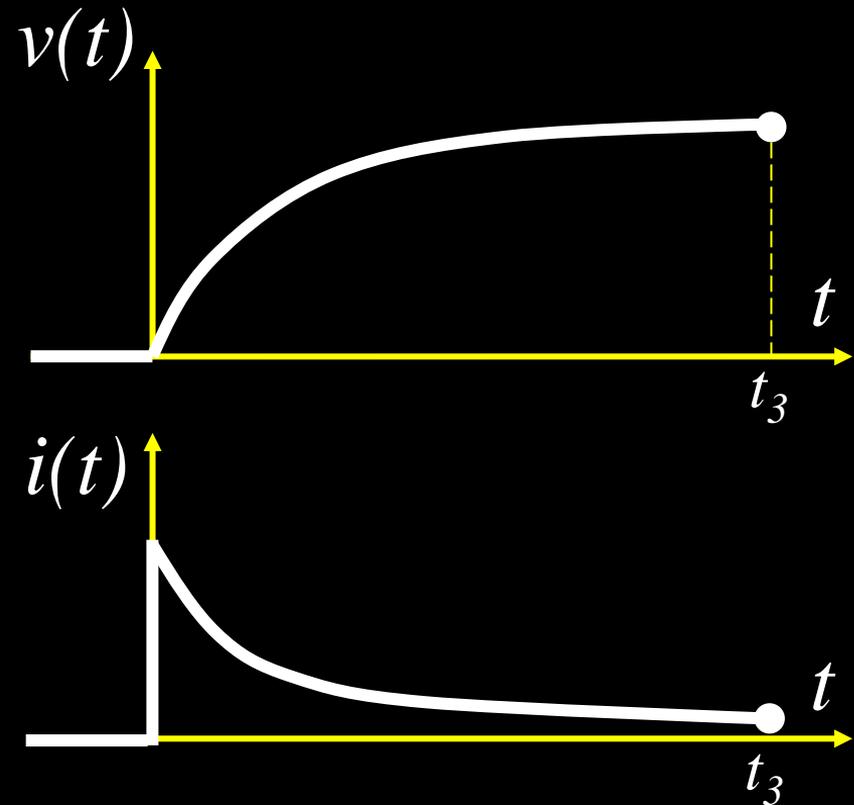
$$v = 0 ; i = 0 \quad (t < 0)$$



2.4 Comportamento em $t = t_3$

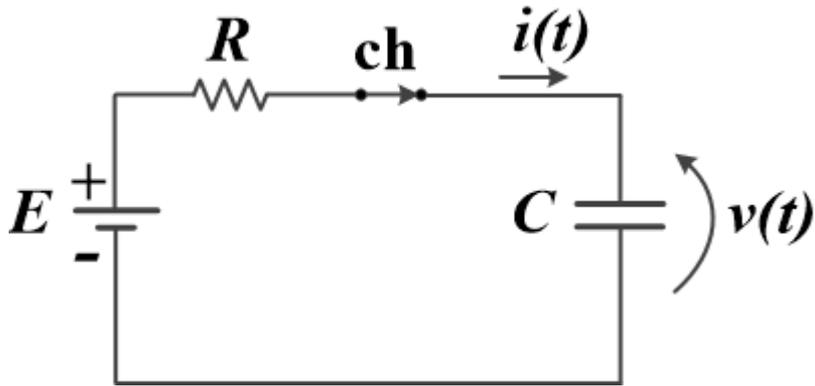


$$v = 0 ; i = 0 \quad (t < 0)$$



2.5 Comportamento Exponencial

Fig. 1



$$v = 0 ; i = 0 \quad (t < 0)$$

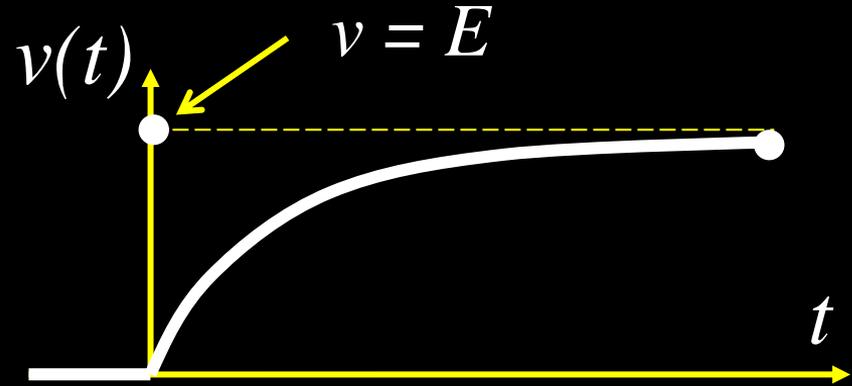


Gráfico 1a

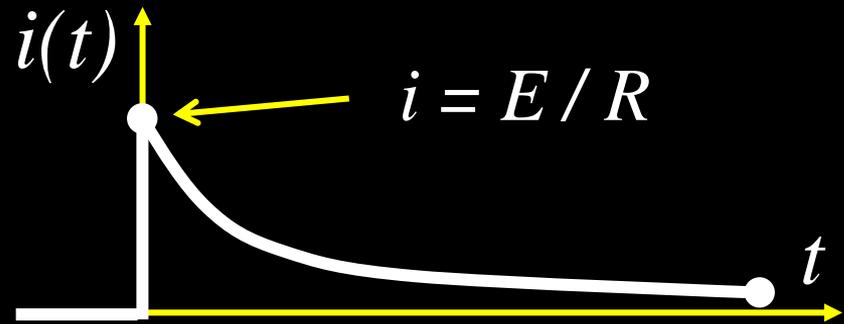
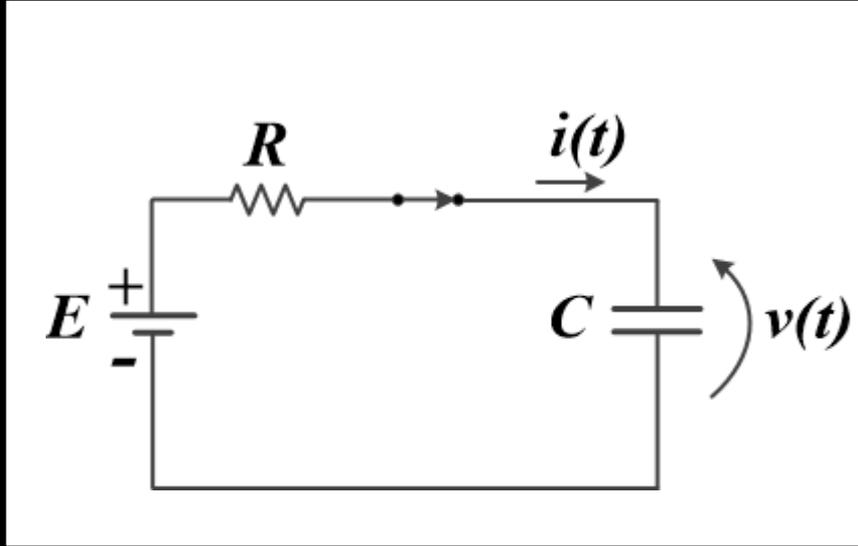


Gráfico 1b

2.6 Equações



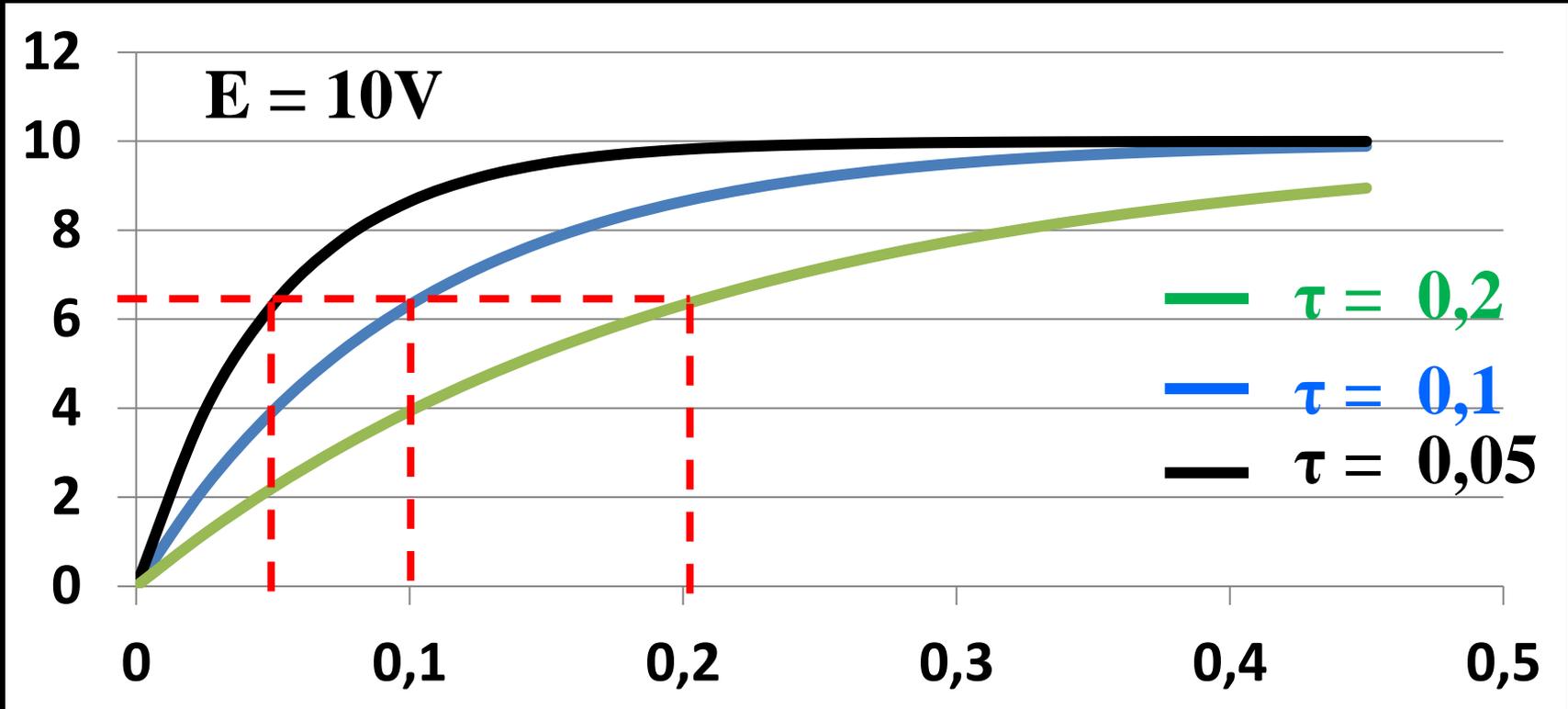
$$E = Ri + v$$

$$E = RC \frac{dv}{dt} + v$$

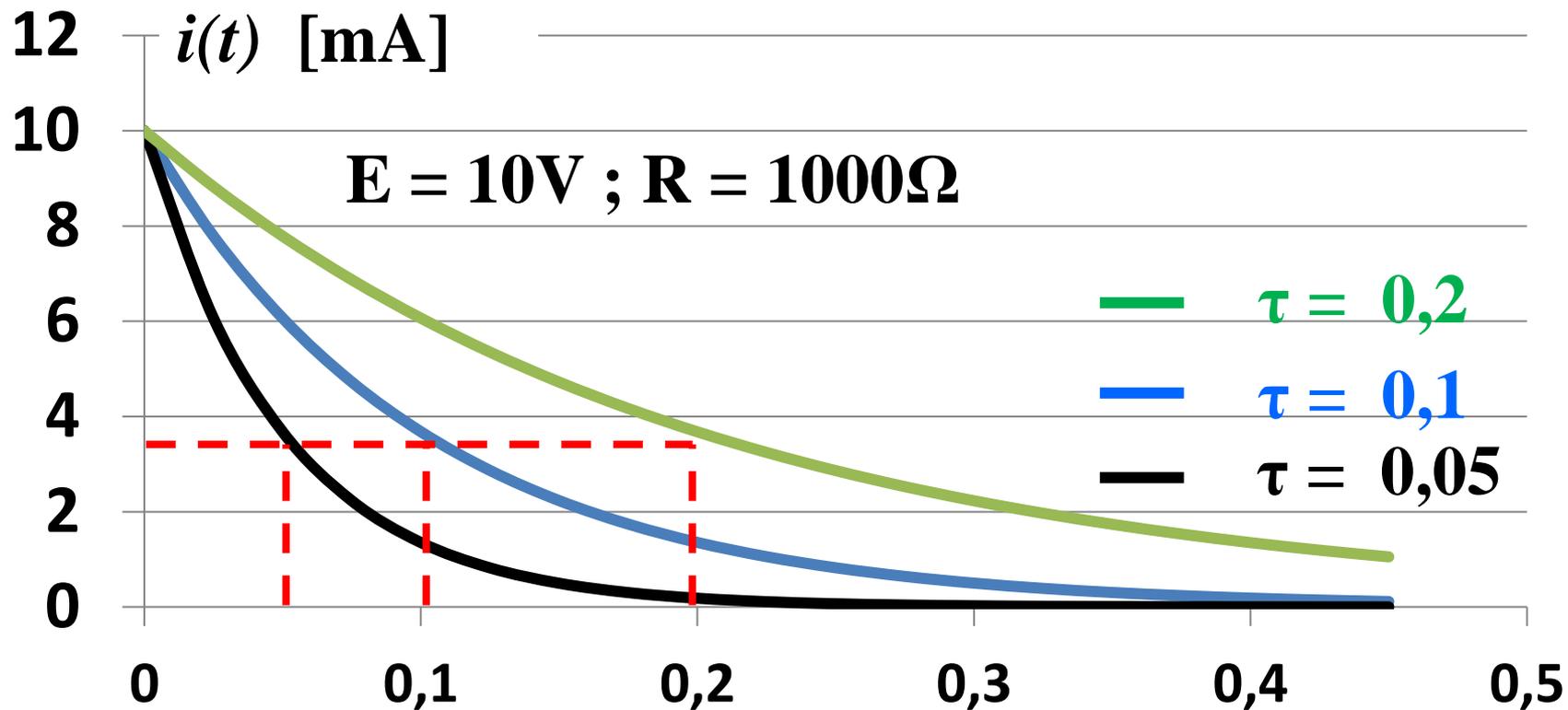
$$\frac{dv}{dt} + \frac{1}{RC} v = \frac{1}{RC} E$$

$$v = E(1 - e^{-t/RC})$$

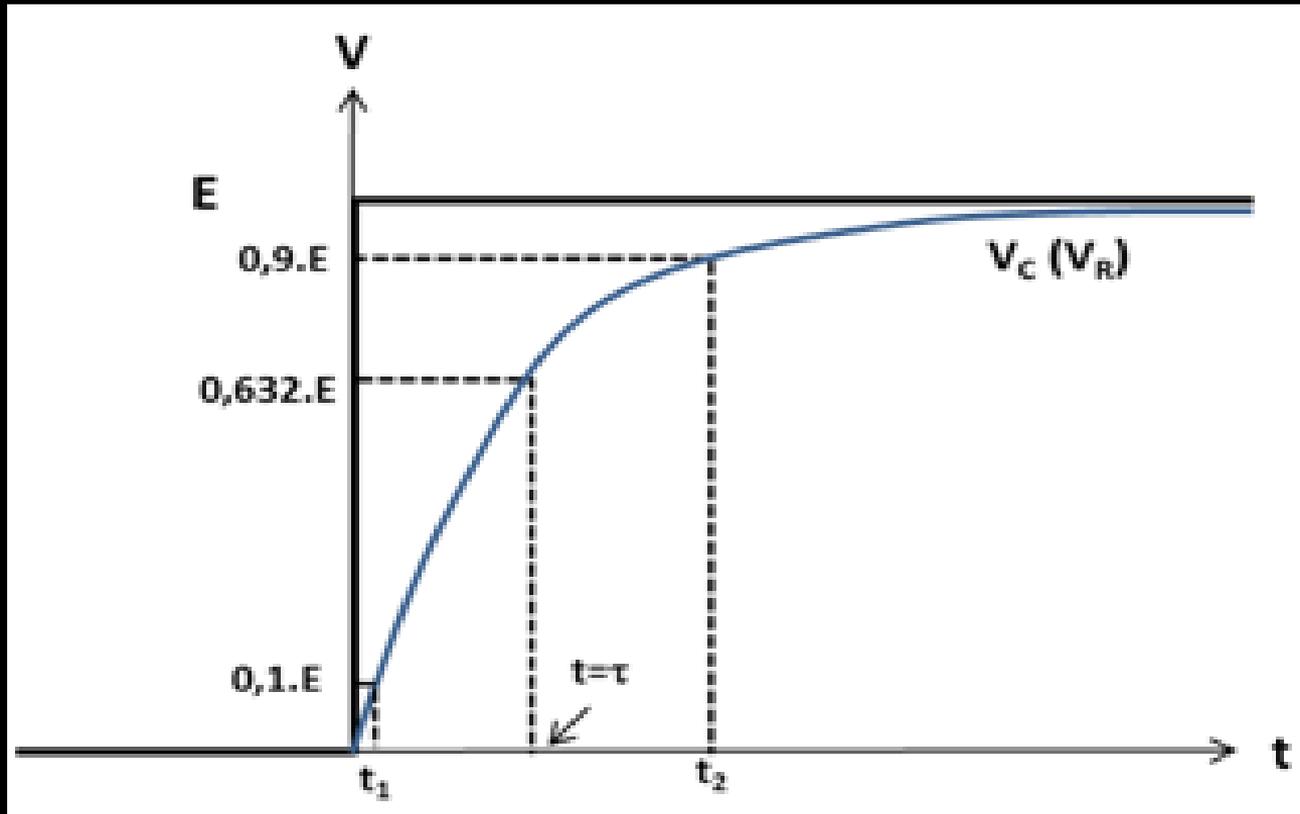
Comportamento da tensão



Comportamento da corrente

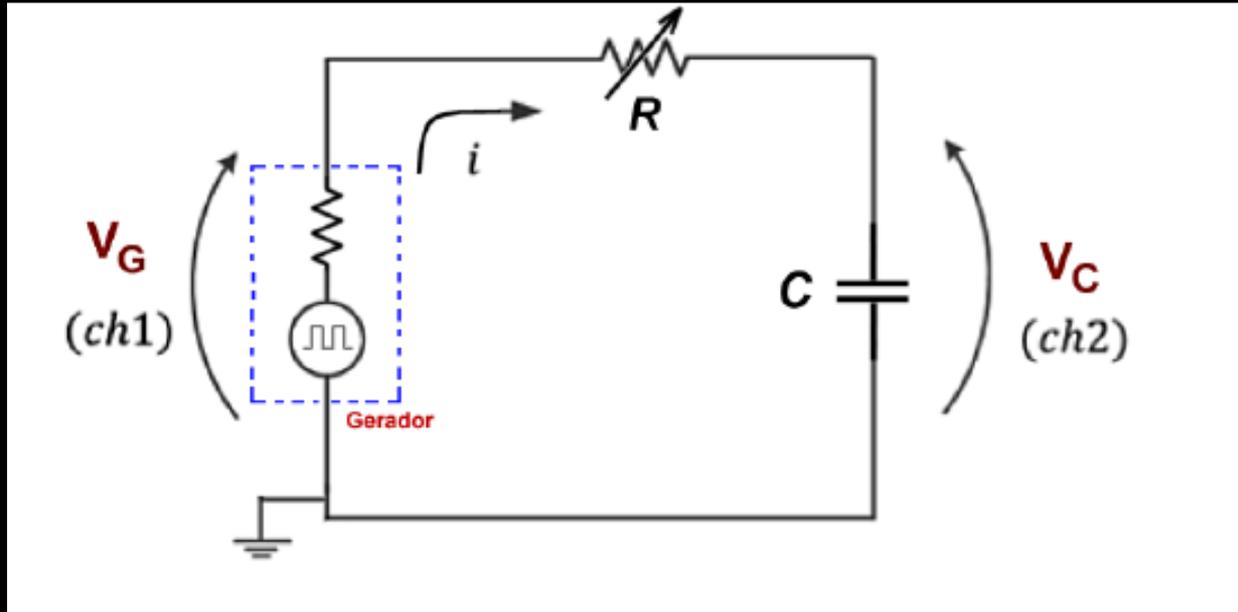


Tempo de subida: $t_r = t_2 - t_1$



Parte Experimental

Circuito RC



Parte Experimental

Circuito RL

