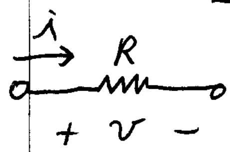
ELEC 226

Review of Chapter 6

5



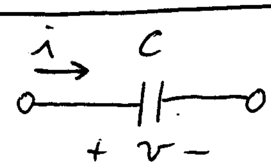
$v = i \cdot R$

$i = \frac{1}{R} v$

$p = v \cdot i$
$= i^2 R = \frac{1}{R} v^2$

$w(t) = \int_{t_0}^{t} p(x)\,dx$

= Energy dissipated during $[t_0, t]$



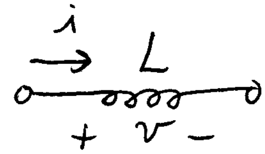
$v(t) = \frac{1}{C}\int_{t_0}^{t} i(x)\,dx + v(t_0)$

$i = C\,\frac{dv}{dt}$

$p = v \cdot i$

$w(t) = \frac{1}{2} C\, v(t)^2$

Energy stored at any time t.



$v = L\,\frac{di}{dt}$

$i(t) = \frac{1}{L}\int_{t_0}^{t} v(x)\,dx + i(t_0)$

$w(t) = \frac{1}{2} L\, i(t)^2$

Energy stored at any time t.

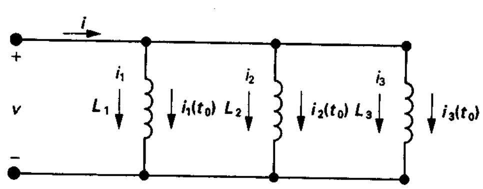
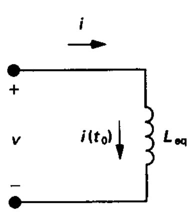


Figure 6.15 Three inductors in parallel.



$$\frac{1}{L_{eq}} = \frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3}$$

$$i(t_0) = i_1(t_0) + i_2(t_0) + i_3(t_0)$$

Figure 6.16 An equivalent circuit for three inductors in parallel.

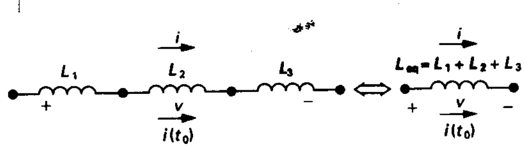
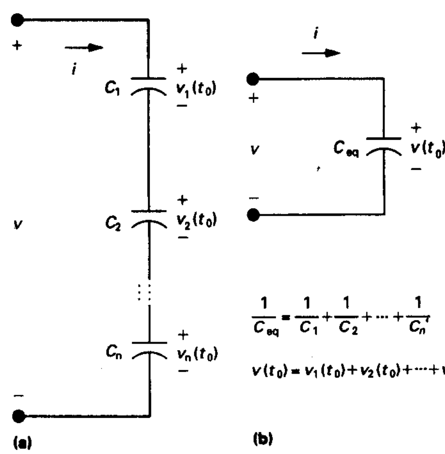
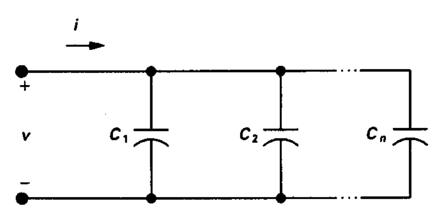


Figure 6.14 An equivalent circuit for inductors in series carrying an initial current $i(t_0)$.

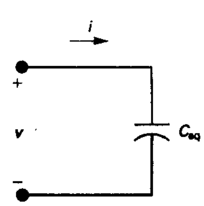


$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots + \frac{1}{C_n}$$

$$v(t_0) = v_1(t_0) + v_2(t_0) + \cdots + v_n(t_0)$$



(a)



$C_{eq} = C_1 + C_2 + \cdots + C_n$

(b)

Table 5-4: Basic properties of R, L, and C.

Property	R	L	C
i–v relation	$i = \frac{v}{R}$	$i = \frac{1}{L} \int_{t_0}^{t} v \, dt + i(t_0)$	$i = C \frac{dv}{dt}$
v-i relation	$v = iR$	$v = L \frac{di}{dt}$	$v = \frac{1}{C} \int_{t_0}^{t} i \, dt + v(t_0)$
p (power transfer in)	$p = i^2 R$	$p = Li \frac{di}{dt}$	$p = Cv \frac{dv}{dt}$
w (stored energy)	0	$w = \frac{1}{2} L i^2$	$w = \frac{1}{2} C v^2$
Series combination	$R_{eq} = R_1 + R_2$	$L_{eq} = L_1 + L_2$	$C_{eq} = \frac{C_1 C_2}{C_1 + C_2}$
Parallel combination	$R_{eq} = \frac{R_1 R_2}{R_1 + R_2}$	$L_{eq} = \frac{L_1 L_2}{L_1 + L_2}$	$C_{eq} = C_1 + C_2$
dc behavior	no change	short circuit	open circuit
Can v change instantaneously?	yes	yes	no
Can i change instantaneously?	yes	no	yes