Dual Network

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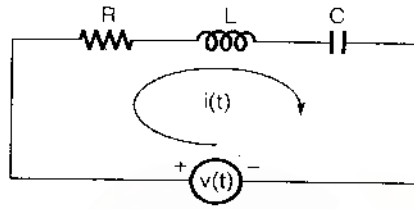
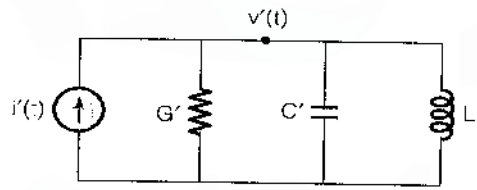


Series RLC circuit (N_1)

By applying KVL,

$$v(t) = Ri(t) + L\frac{di}{dt} + \frac{1}{C}\int_0^t i(t)\,dt$$



Parallel RLC circuit (N_2)

By applying KCL,

$$i'(t) = v'(t)\,G' + C'\frac{dv'(t)}{dt} + \frac{1}{L'}\int_0^t v'(t)\,dt$$

- The networks N_1 and N_2 are called dual networks but these networks are not equivalent networks and therefore, the network N_1 cannot be replaced by N_2 network.
- The KVL equation for network N_1 has similar format as for the KCl equation for network N_2. Therefore, if the response of the first network is known is terms of current i(t) then the response of its dual network for voltage v'(t) can be directly written without actually solving it by using necessary transformation by various elements as follows:

N_1	N_2
v(t)	i(t)
R	G
G	R
L	C
C	L
KVL	KCL

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