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35. The L-R-C Parallel Circuit

We have $v = V_m \cos(\omega t)$

a. show that the voltage and current relation

— Since all elements are in parallel (L-R-C)

so $V_R = V_L = V_C = V(t)$

— Since total current is the sum of all branch currents (KCL)

so $i = i_R + i_L + i_C$

b. Find the phase of $\vec{i}_R, \vec{i}_L, \vec{i}_C$ with respect to v

— For R $\vec{i}_R = \frac{V}{R}$

Phase is 0 because the current is in phase with voltage

— For L $\vec{i}_L = \frac{V}{j\omega L}$

Phase is -90° because the current lags the voltage by 90°

$\phi_L = -90^\circ$

— For C $\vec{i}_C = j\omega C V$

Phase is 90° because the current leads the voltage $\phi_C = 90^\circ$

Use phasors: $\vec{i} = \vec{i}_R + \vec{i}_L + \vec{i}_C$

