

ee101_reso_rlc_2.sqproj

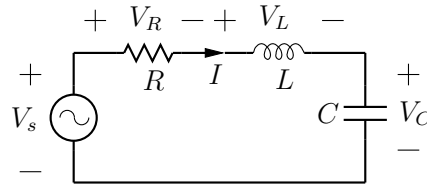


Figure 1: Series RLC circuit driven by a sinusoidal source.

Fig. 1 shows a series RLC circuit with a sinusoidal input voltage. We are interested in the circuit behaviour in the sinusoidal steady state. As described in the document for ee101_reso_rlc_1.sqproj, the amplitude of the current I is maximum at resonance and is given by V_m/R . The purpose of this exercise is to observe the resonance behaviour in the time domain and also note other interesting features about this circuit.

Exercise Set

1. Calculate the resonance frequency f_0 for the component values given in the circuit file.
2. Plot the current I versus time for different frequencies: f_0 , $4f_0$, and $f_0/4$. Explain the salient features in the plots. (Note that the simulation has been set up such that the user only needs to set the global parameter `f_hz` to the desired value of the source frequency. After running the simulation, steady-state time-domain quantities are available for plotting.)
3. Plot V_R , V_L , V_C (together) versus time for different frequencies: f_0 , $4f_0$, and $f_0/4$. Explain the salient features in the plots.
4. Decrease the value of R by a factor of 2, and plot V_R , V_L , V_C versus time at resonance. Comment on the difference you observe with respect to the earlier value of R .