LC Tank with Resistance

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Abstract

The problem is to simulate the behaviour of a LC tank with a resistance applied across a voltage in series with given initial conditions of the charge in the capacitor and current in the inductor.

- Public git repo with open source code is available on `https://github.com/vikaskurapatibat/SDES_Project1`
- Ipython 2.3.0 is used to run the IPython notebook. So the version 2.3.0 or higher is preferrable to run the notebook.
- numpy version 1.8.2 is used. So numpy version 1.8.2 or higher is preffered to run the code.
- matplotlib version 1.4.2 is used. So matplotlib version 1.4.2 or higher is preffered to run the code.

Governing Equation for the problem

The governing equation for this electrical problem is

$$\frac{d^2V_C}{dt^2} + \frac{R}{L}\frac{dV_C}{dt} + \frac{V_C}{LC} = \frac{V_S}{LC} \tag{1}$$

where V_C is the voltage across the capacitor varying with time, R is the resistance of the resistor, L is inductance of the inductor,C is the capacitance of the capacitor and V_S is the voltage of the source voltage under the initial conditions of $V_C(0^+) = V_)$ the initial capacitor voltage and $\frac{dV_C}{dt}(0^+) = \frac{i_0}{C}$, where initial inductor current is i_0.