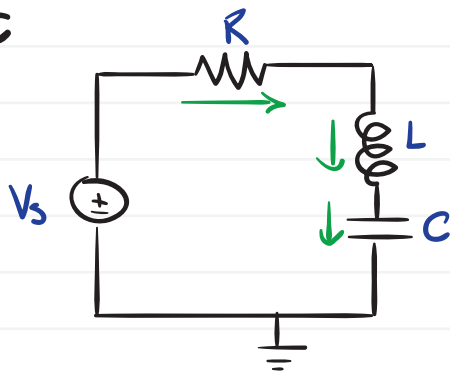


Schematic



Elemental equations

$$v_R = i_R R \quad \frac{di_L}{dt} = \frac{1}{L} v_L \quad \frac{dv_C}{dt} = \frac{1}{C} i_C$$

Continuity (KCL)

$$i_R = i_L \quad i_L = i_C$$

Compatibility (KVL)

$$v_s = v_R + v_L + v_C$$

$$\vec{x} = \begin{bmatrix} v_C \\ i_L \end{bmatrix}$$

$$\dot{\vec{x}} = A\vec{x} + B\vec{u}$$

Algebra

$$\frac{dv_C}{dt} = \frac{1}{C} i_C = \frac{1}{C} i_L \quad \checkmark$$

$$\frac{di_L}{dt} = \frac{1}{L} v_L = \frac{1}{L} (v_s - v_R - v_C) = \frac{1}{L} (v_s - i_L R - v_C) = \frac{1}{L} (v_s - i_L R - v_C) \quad \checkmark$$

$$\frac{d\vec{x}}{dt} = \underbrace{\begin{bmatrix} 0 & 1/C \\ -1/L & -R/L \end{bmatrix}}_A \begin{bmatrix} v_C \\ i_L \end{bmatrix} + \underbrace{\begin{bmatrix} 0 \\ 1/L \end{bmatrix}}_B [v_s]$$