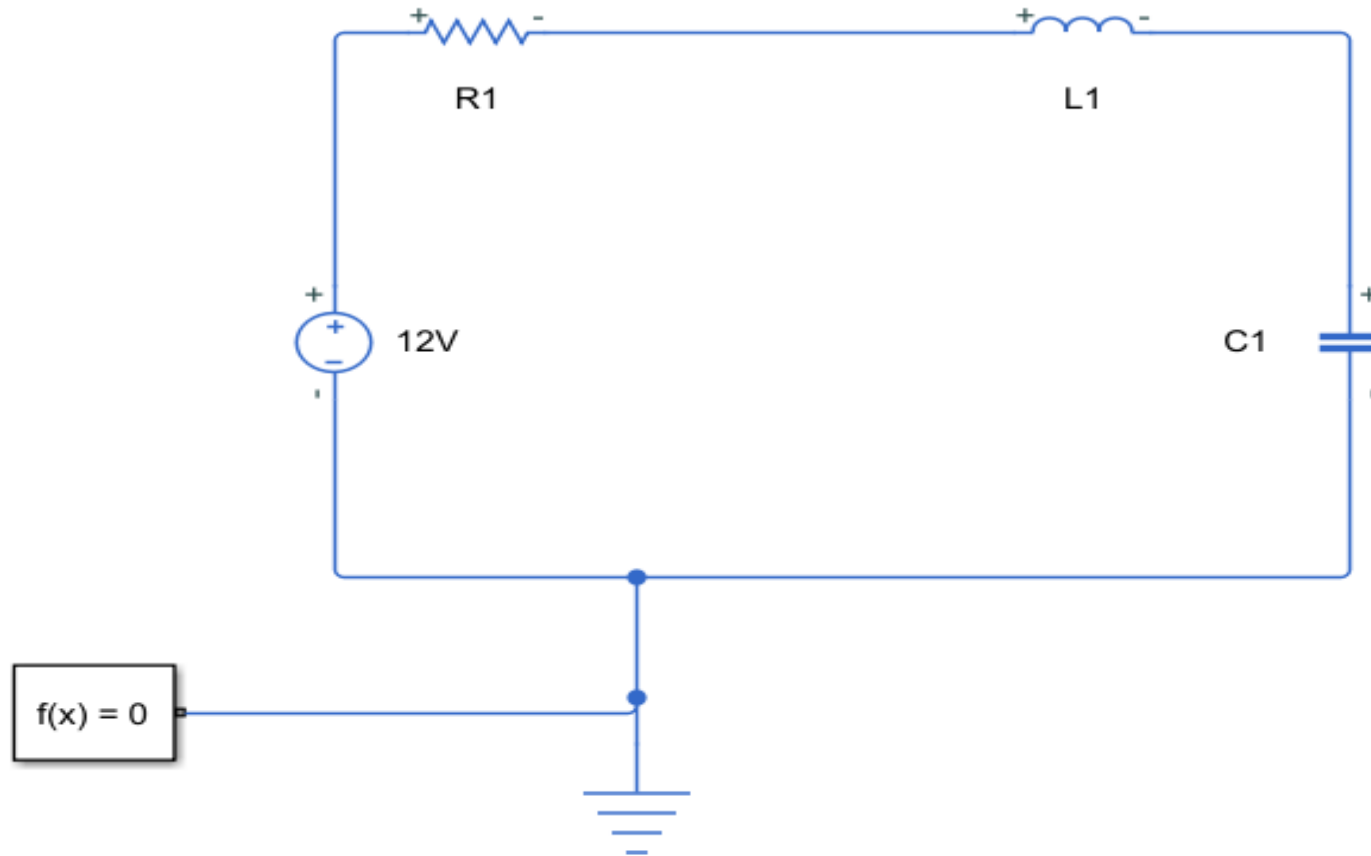# Modeling and simulation of three electrical circuits

Emanuel Cruvinel

Overview

▶ We'll be modeling three electrical circuits using Simscape® (Simulink package)

▶ All the circuits may have a DC voltage source, DC current source, resistors, capacitances and inductors.

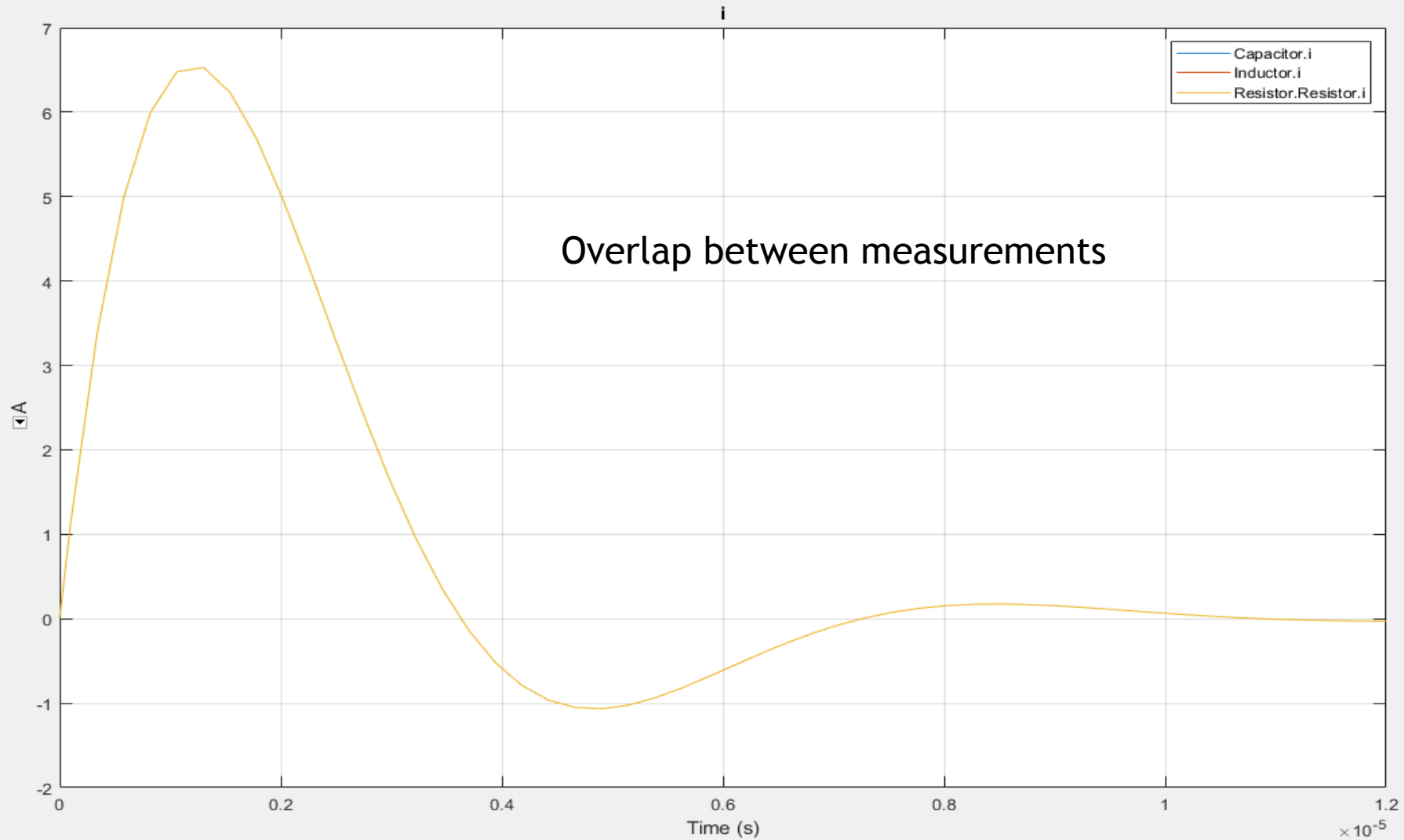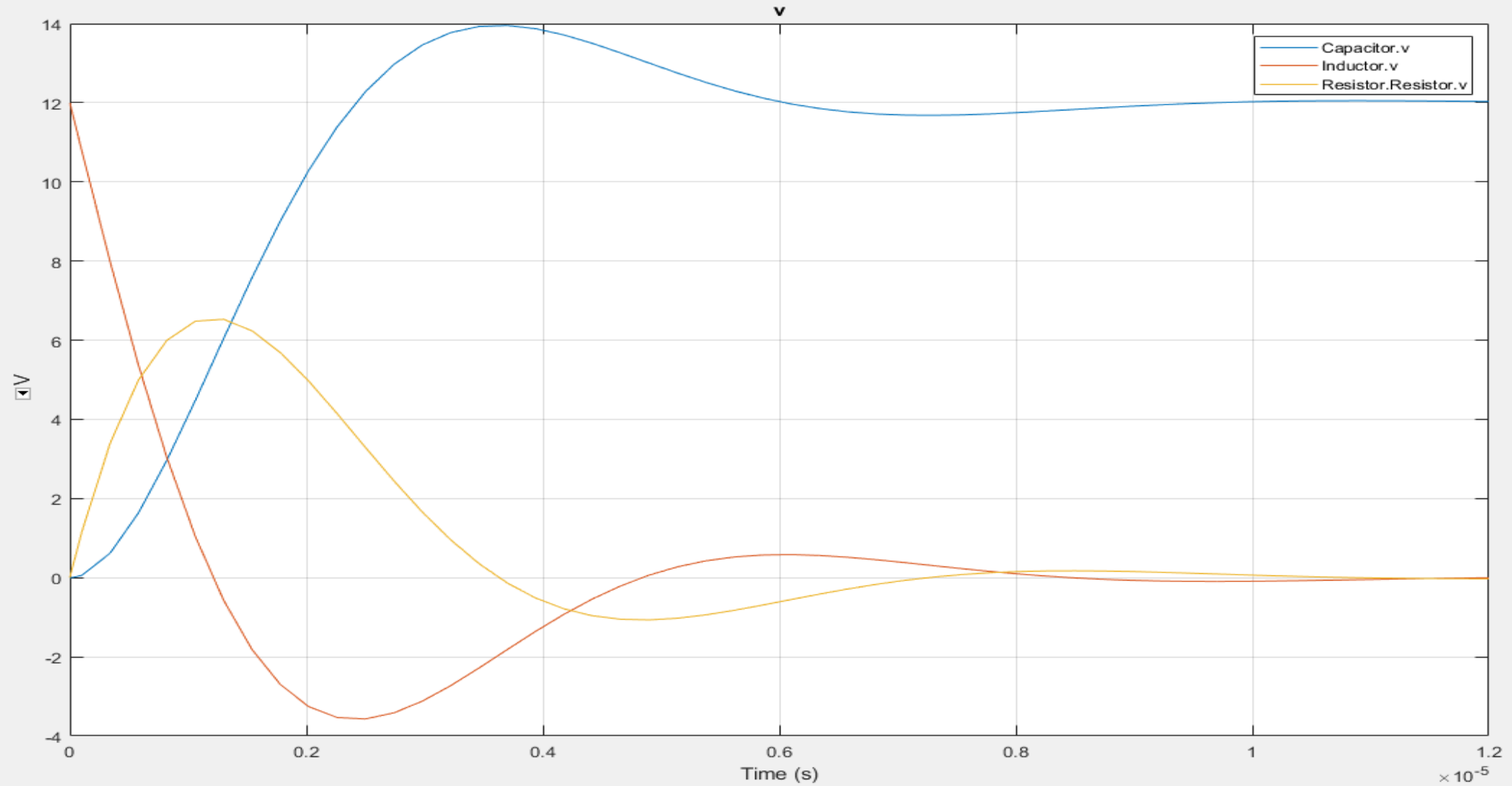▶ Current and voltage will be measured on each circuit component.

First model

Input parameters

- R1 = 1 ohm
- C1 = 1 μF
- L1 = 1 μH
- DC Voltage Source = 12 V
- Simulation time = 1.2e-6 seconds

Results: Current (A)

Overlap between measurements

Results: Voltage (V)

Second model
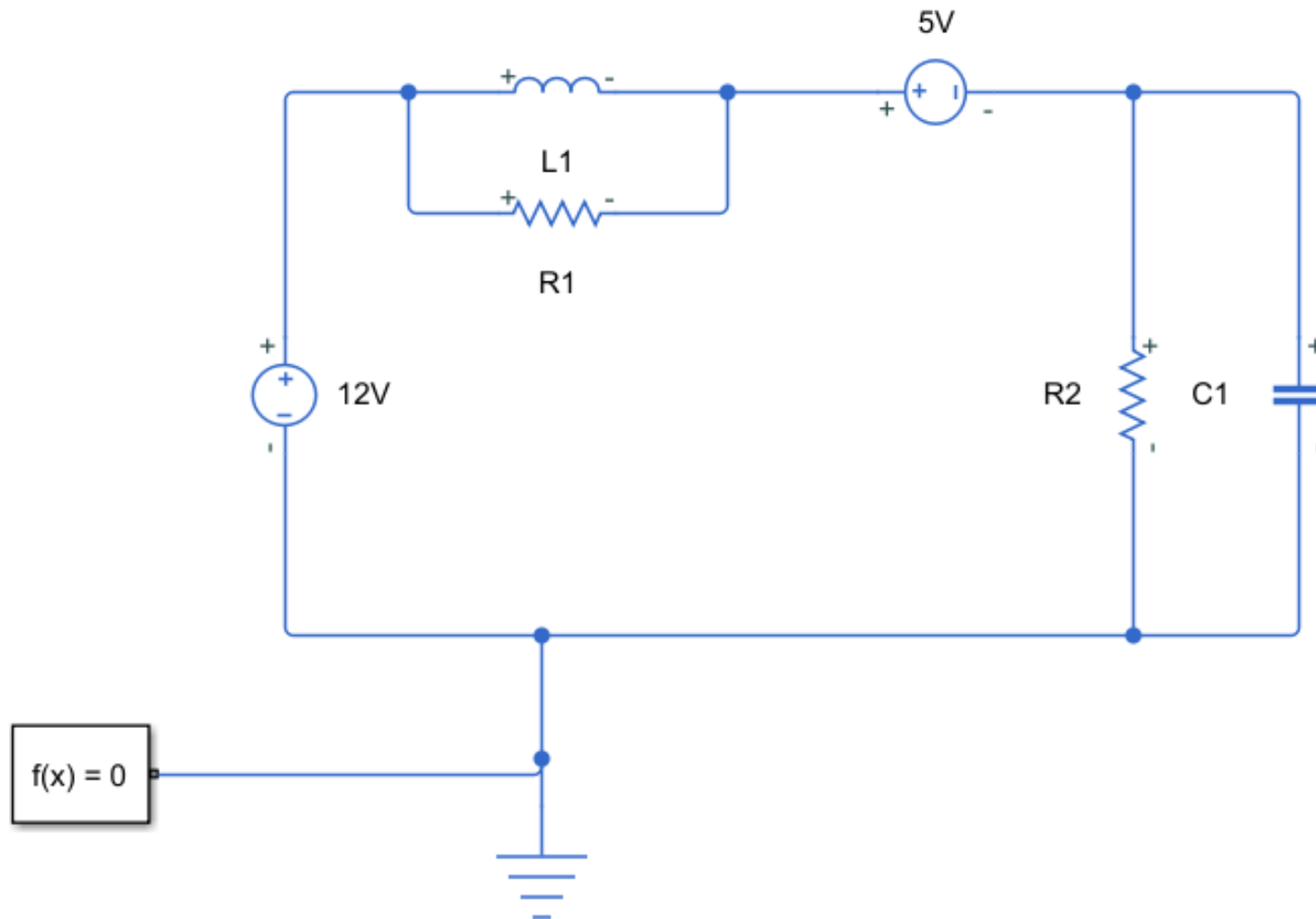
Input parameters

- R1 = 1 ohm
- R2 = 5 ohms
- C1 = 1 μF
- L1 = 1 μH
- DC Voltage Source 1 = 12 V
- DC Voltage Source 2 = 5 V
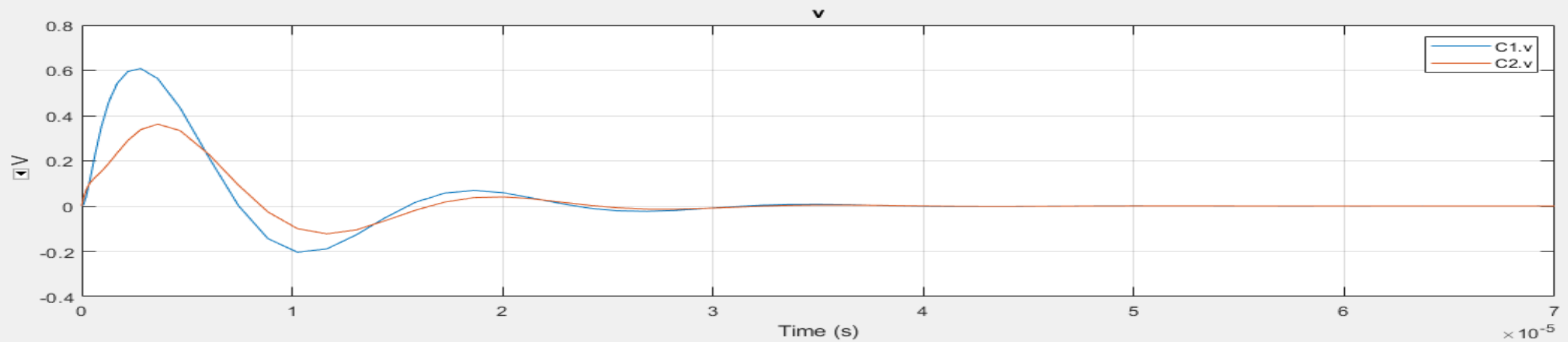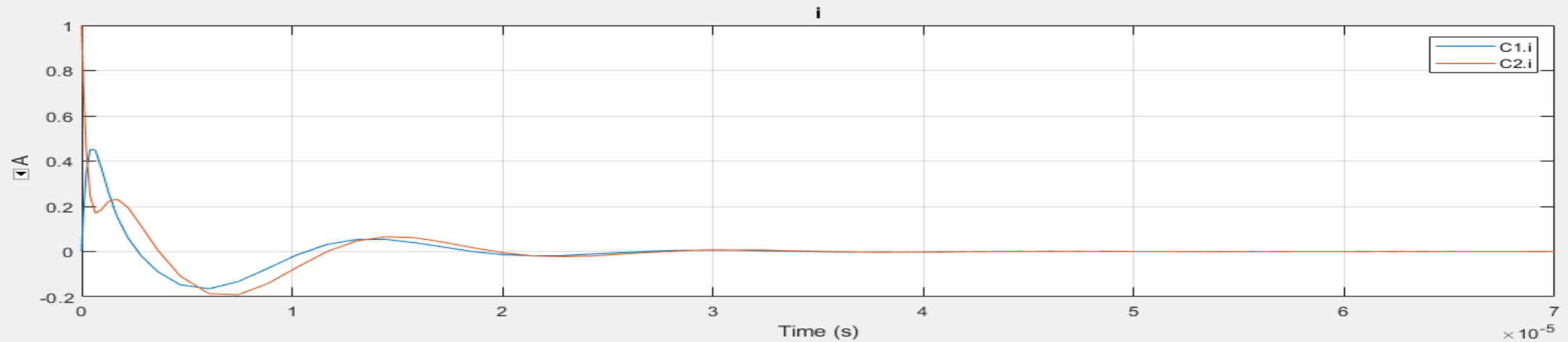- Simulation time = 1.2e-5 seconds

Results: Voltage (V)

C1 voltage overlaps with R2 (parallel circuit) whereas L1 voltage overlaps with R1
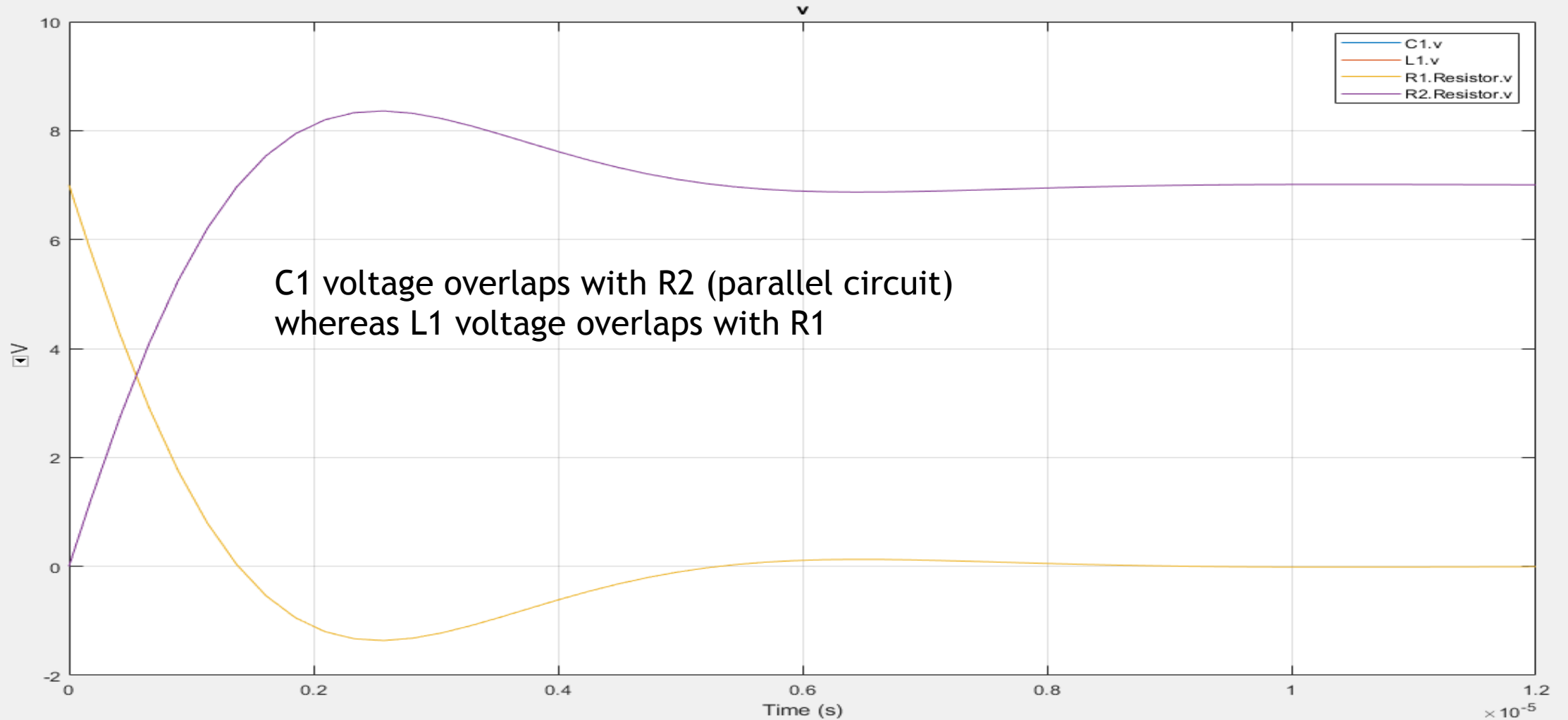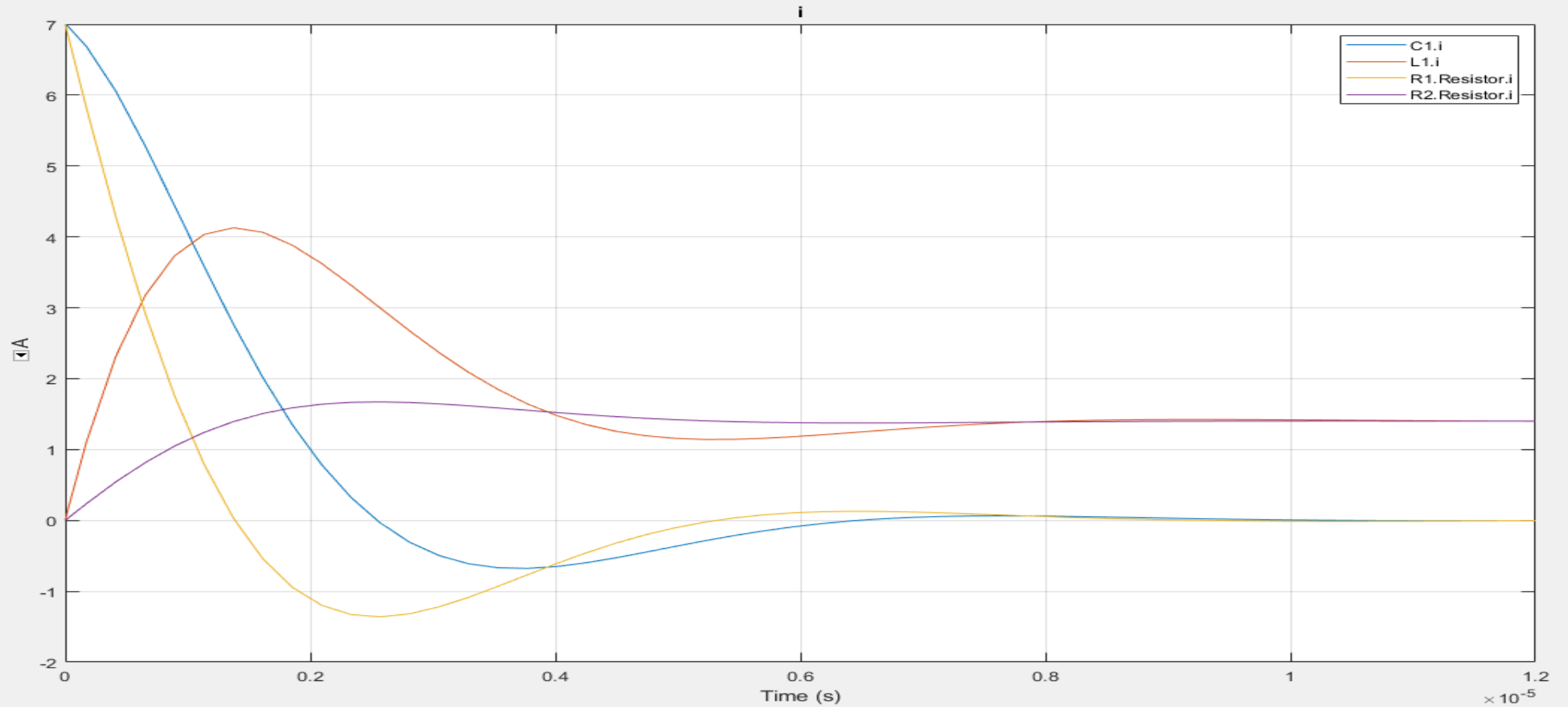
Results: Current (A)

Third Model
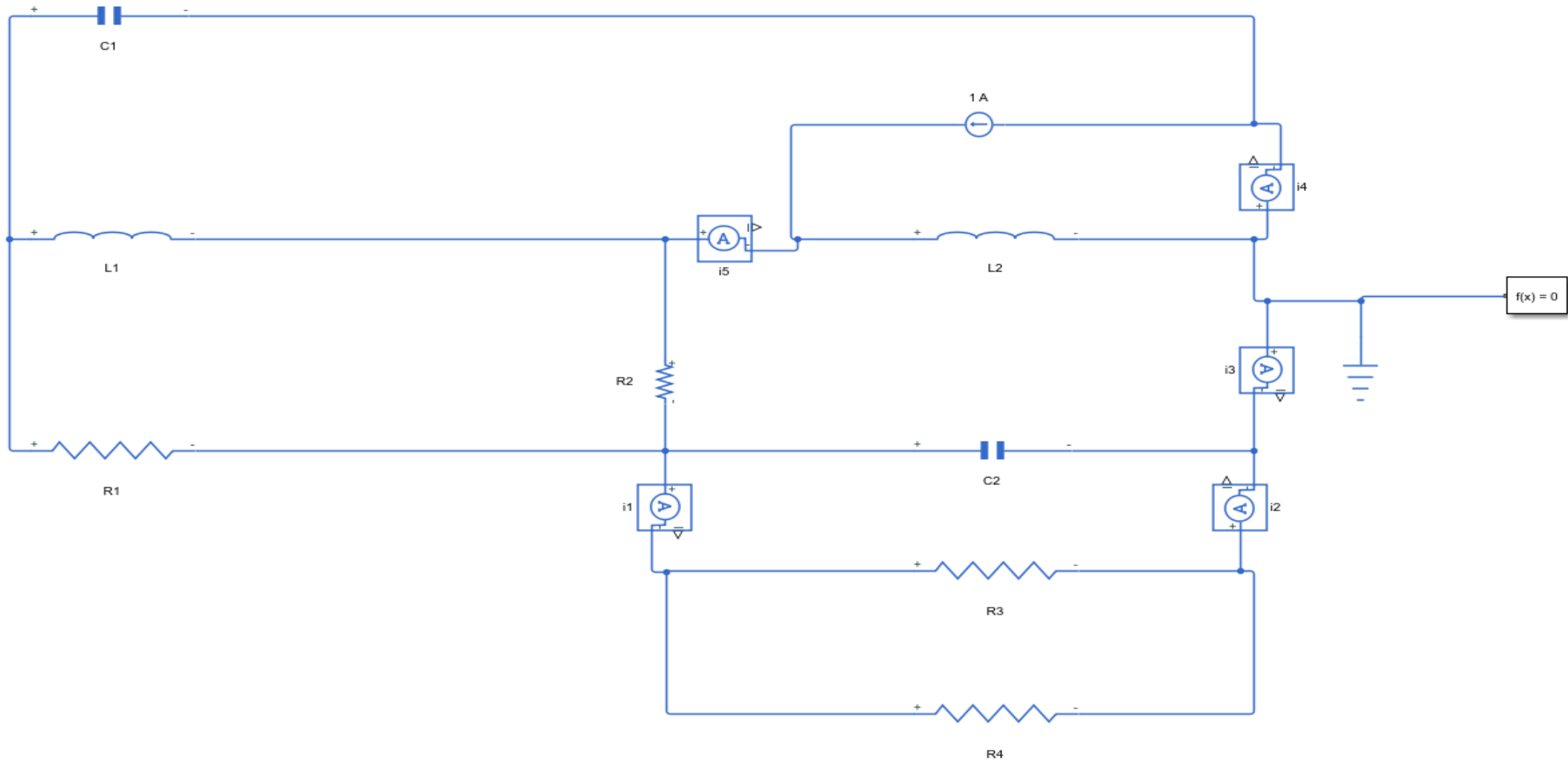
Input parameters

- R1 = 1 ohm
- R2 = 2 ohms
- R3 = 3 ohms
- R4 = 4 ohms
- C1 = 1 µF
- C2 = 2 µF
- L1 = 1 µH
- L2 = 2 µH
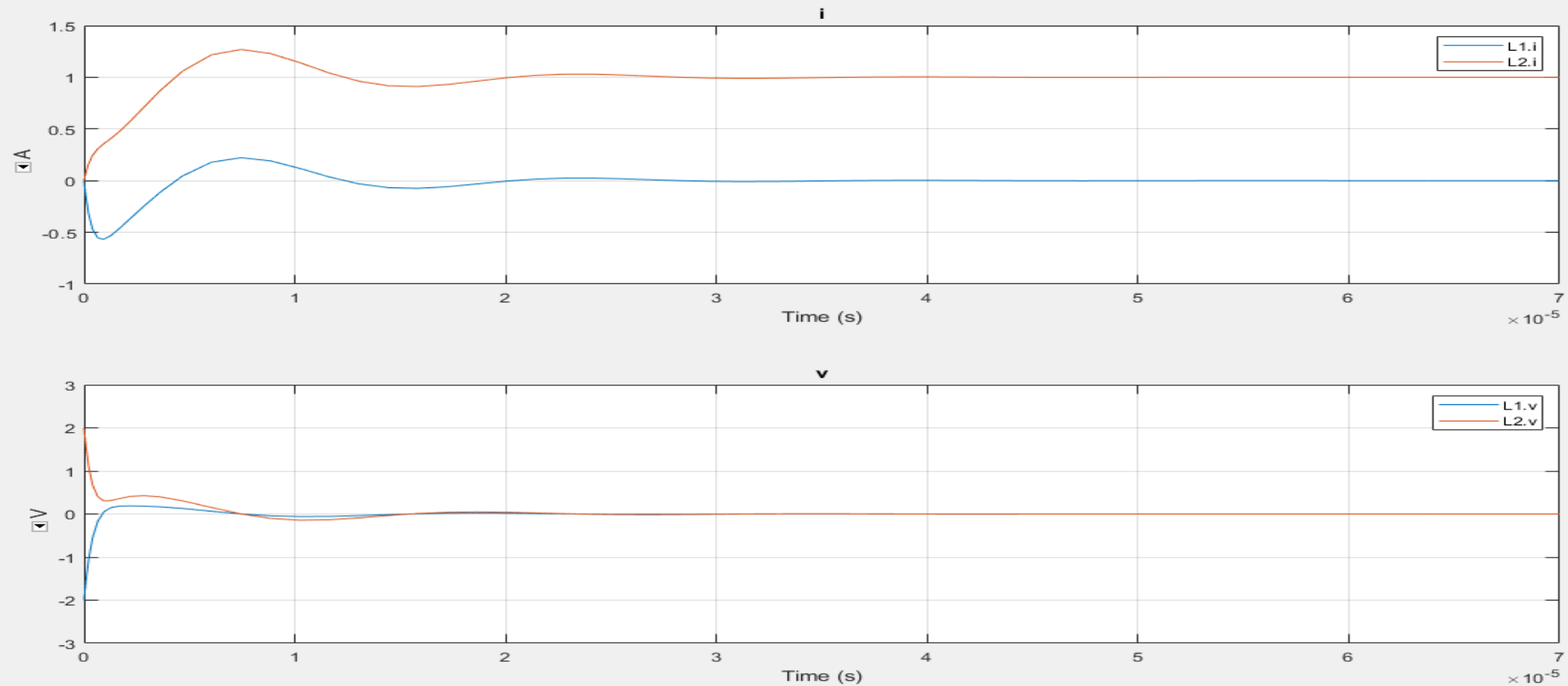- DC Current Source = 1 A
- Simulation time = 7e-5 seconds

Results: Current (A) and Voltage (V) on Capacitors

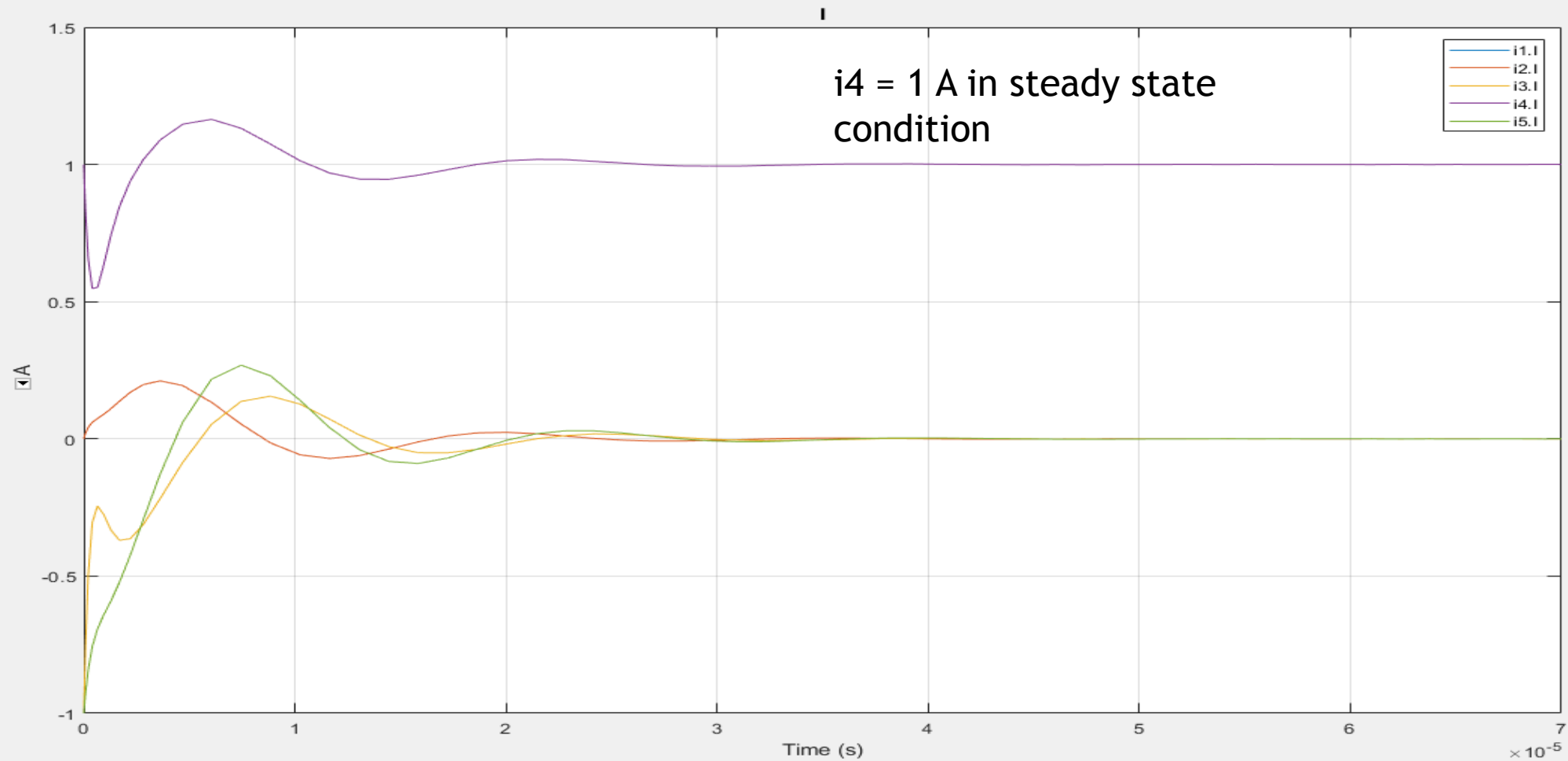# Results: Current (A) and Voltage (V) on Resistors
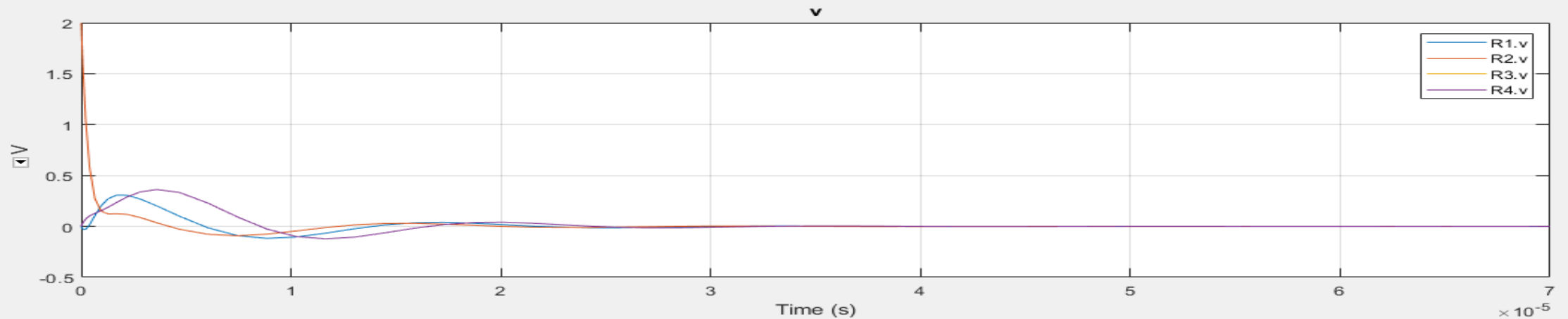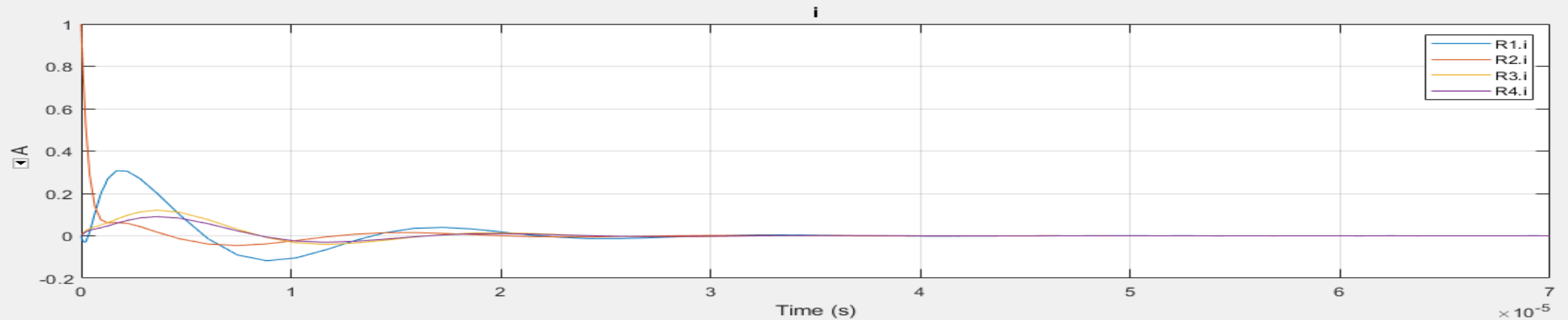
Results: Current (A) and Voltage (V) on Inductors

Results: Current i1 to i5 (A)

i4 = 1 A in steady state condition

Conclusions

- All three electrical circuits were modeled using Simscape®
- The results are in agreement with RLC circuit theory