**EE49001: Control and Electronic System Design**

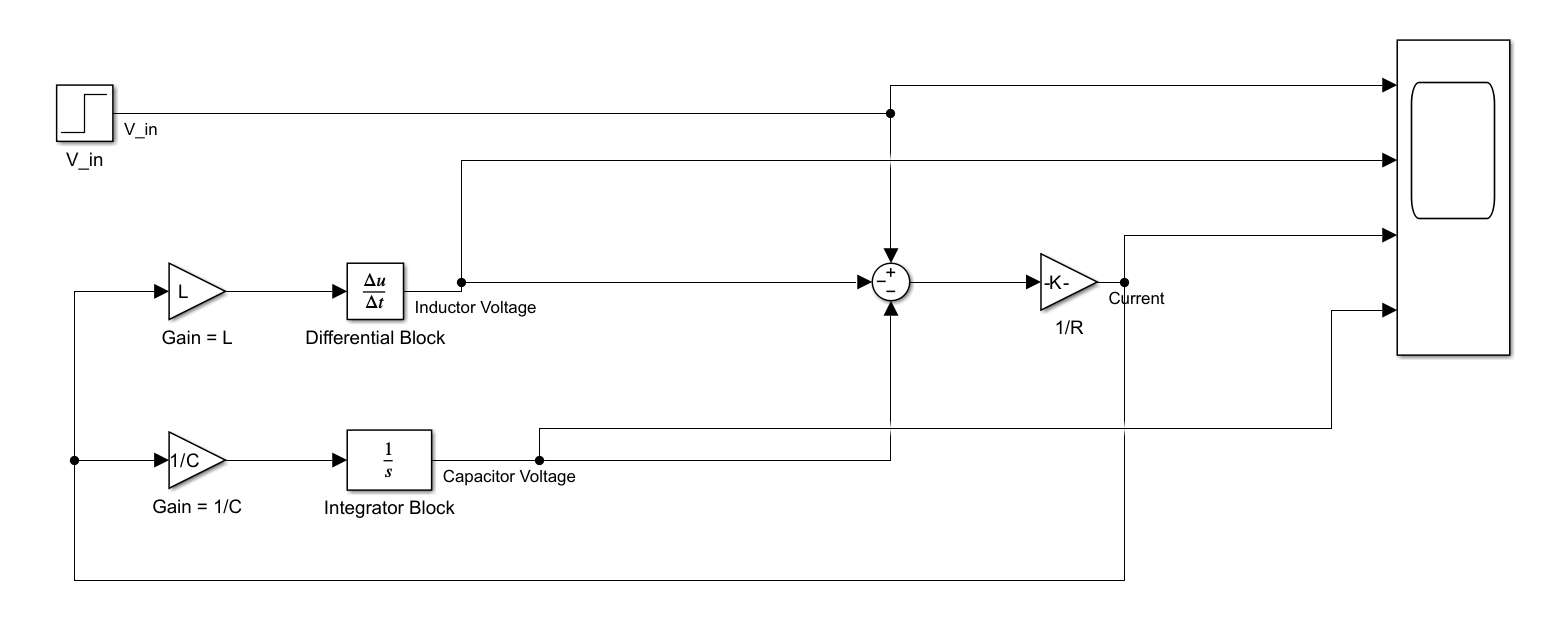
**Assignment-1**

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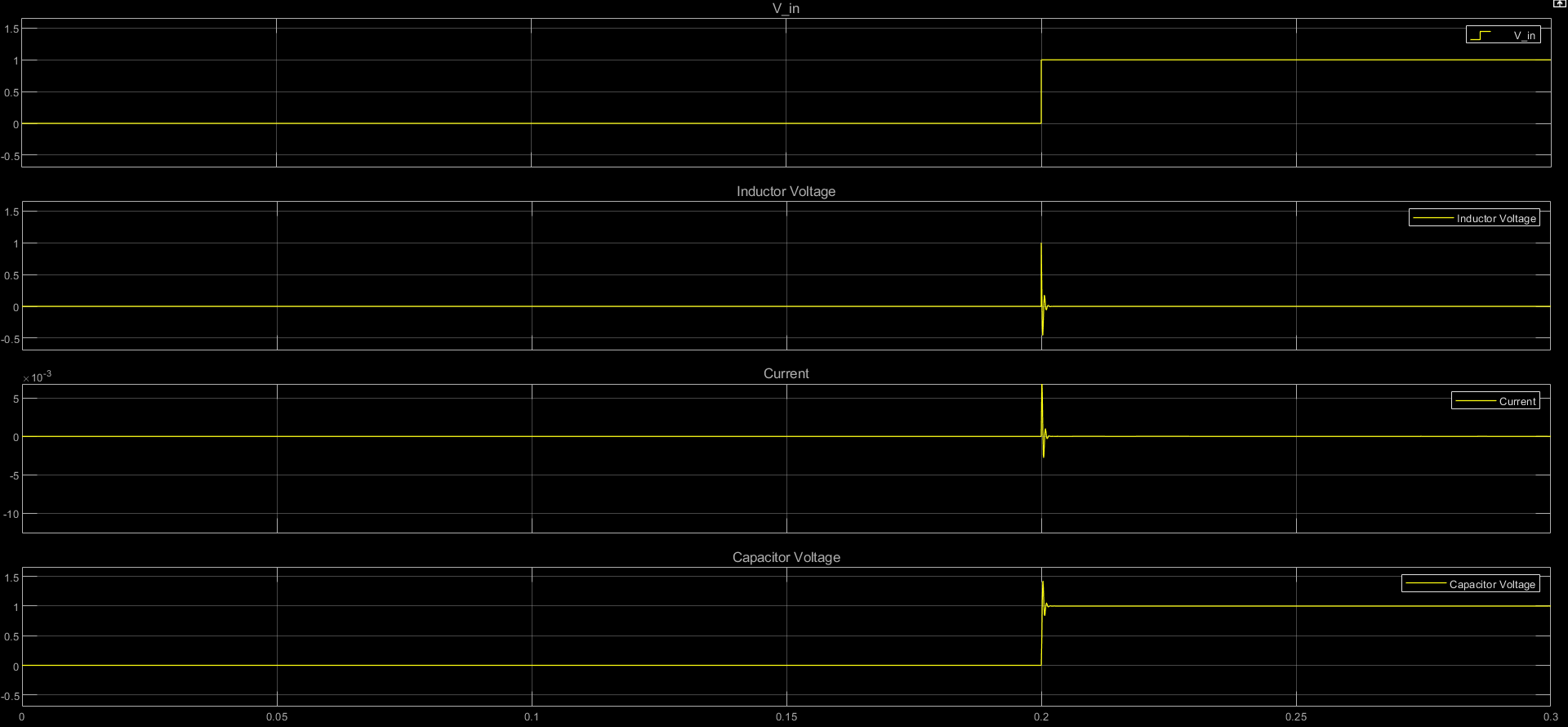
# Representing an inductor as a block with TF of and a capacitor as a block with TF of , obtain a block diagram representation of a series RLC circuit excited by a voltage source .



The Transfer function:

The same transfer function can be realised in two mathematically equivalent forms.

# Using MATLAB-SIMULINK, obtain the voltage responses and the current when is the unit step input, ,



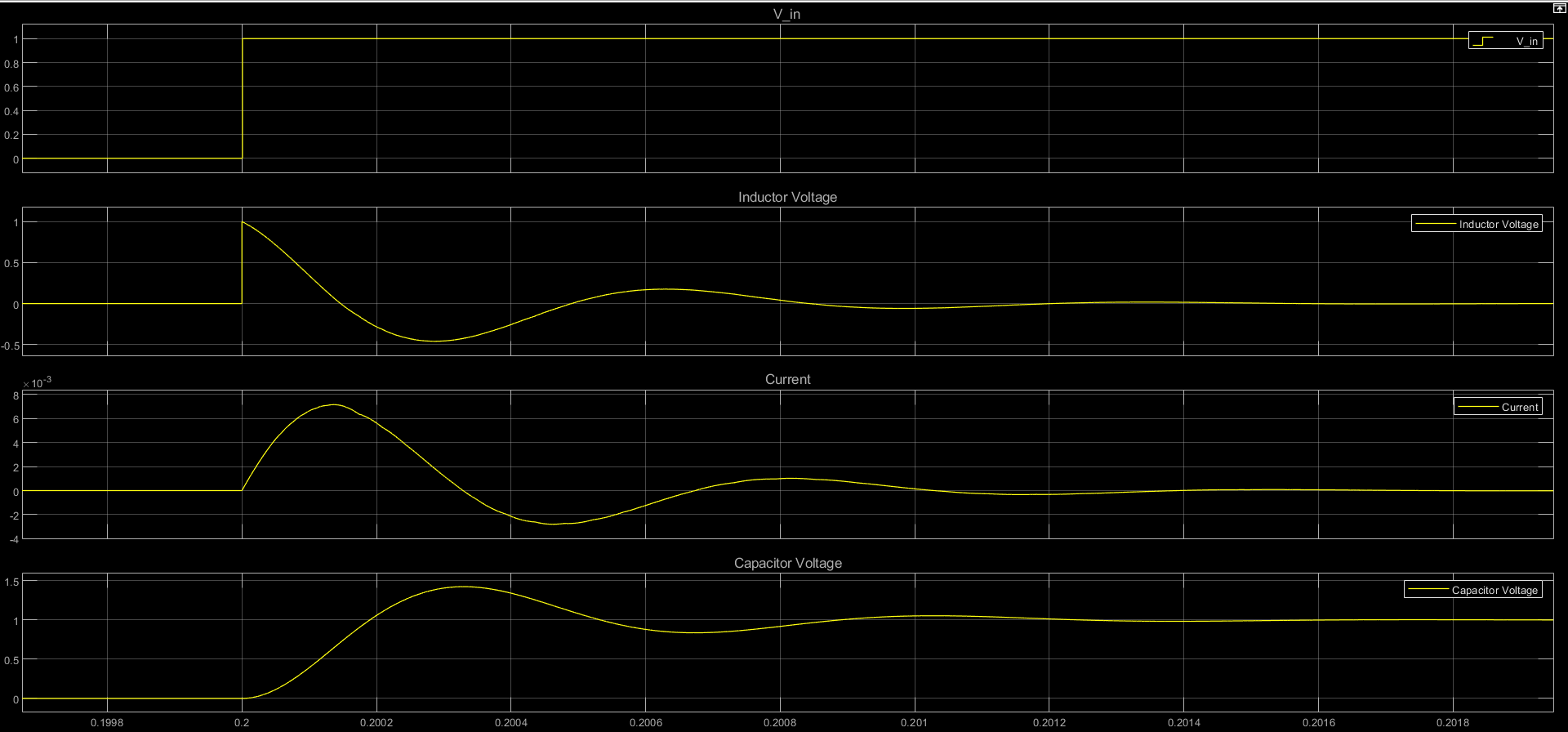


Fig: Simulink Plot for configuration-1

Here, we use the transfer function:

# Repeat the above considering the TF of inductor as and capacitor as .

For this part of experiment, we are taking the inductor impedance as . Therefore, the transfer function is given by:

For the given conditions, the MATLAB-Simulink Block Diagram is given as:

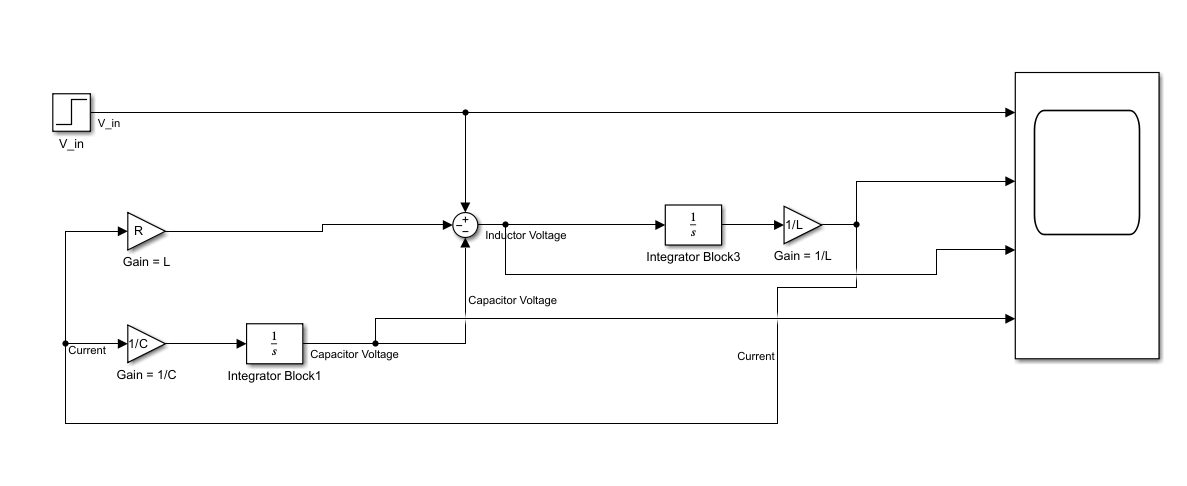
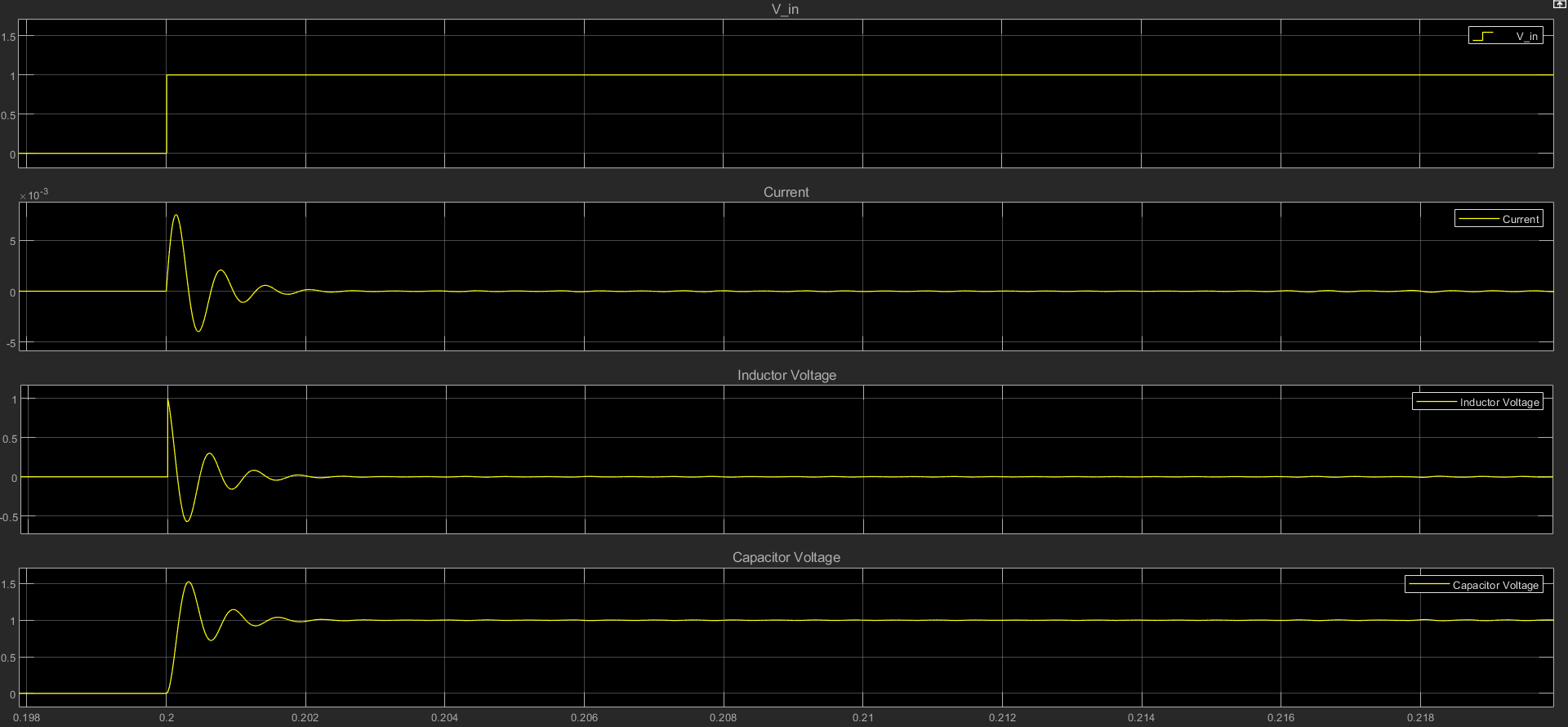


Fig. MATLAB-Simulink Block Diagram

On execution, we get the following waveform for



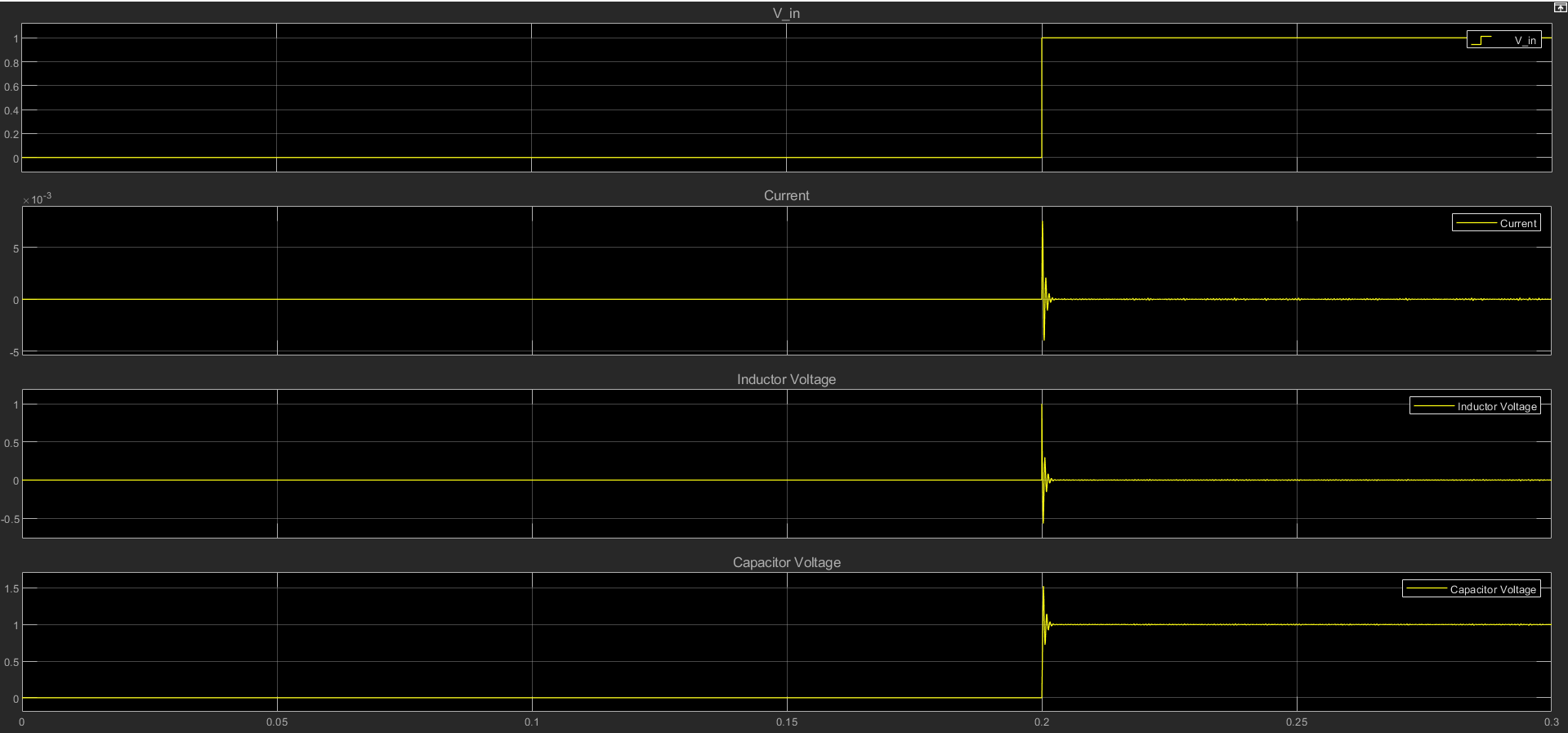


Fig. Plots for configuration-2

# Are the responses obtained in (1) and (2) identical? If not, explain the reason behind the difference and explain which of the above representations is more appropriate.

|  |  |  |
| --- | --- | --- |
|  | Response in Configuration-1 | Response in Configuration-2 |
|  | Jump of 0.025 A at t=0, past t=0, a damped oscillation | Continuous at t=0 and then damped oscillation |
|  | At t=0, and at | Jump of 1 V at t=0 and later a damped oscillation |
|  | %overshoot is > 100% | %overshoot is around 50% |

Both the configurations show different behaviour, as is an improper transfer function, non-causal and hence, physically unrealizable. This is because, it involves a derivative. Since, the computation of derivatives needs information about the future. Also, derivative amplifies noise and distorts the output at input discontinuities. But this effect is removed in case of as it’s a proper transfer function and hence, more appropriate.