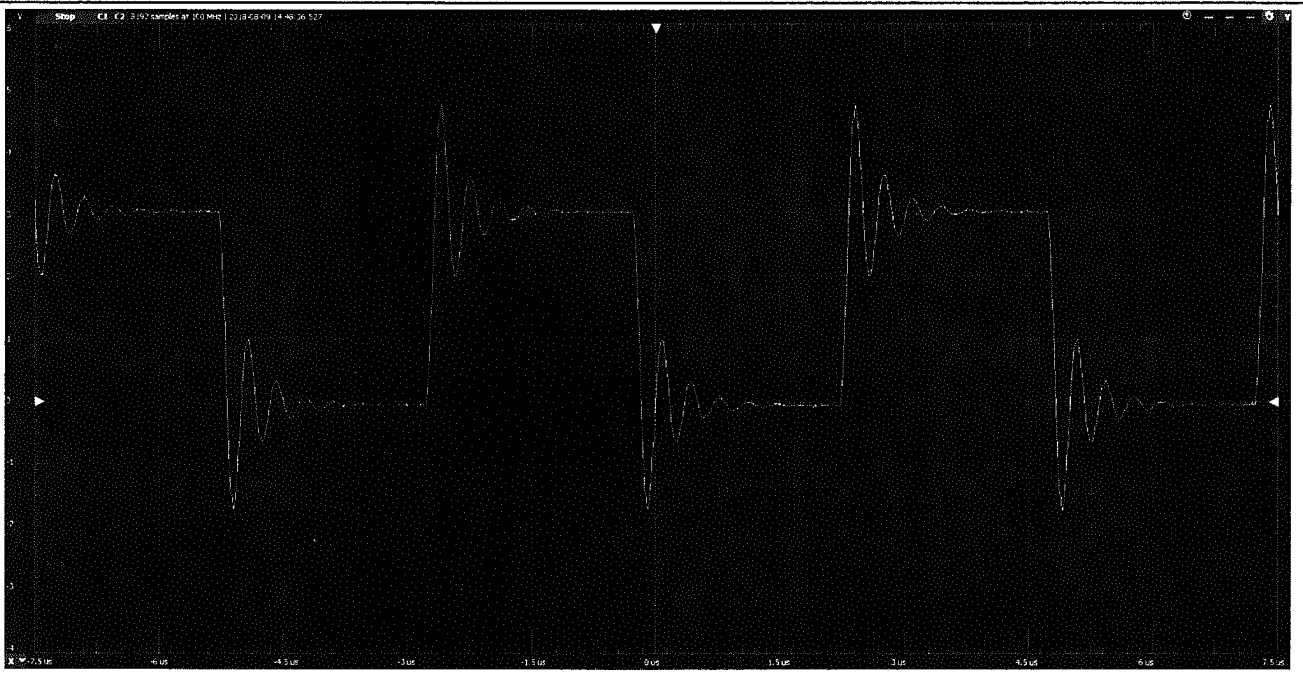
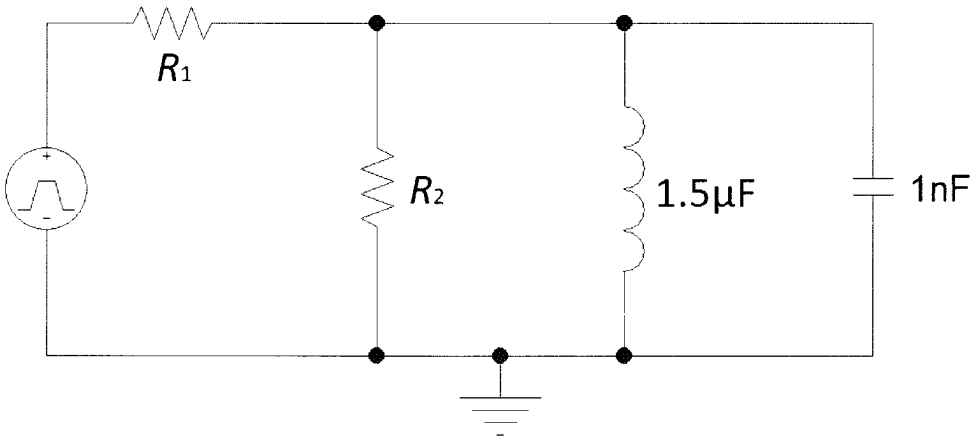


Comparing the simulated waveform with the actual waveform, we can see that the results are very similar, as expected. Both show an undamped behaviour as predicted in part ii.

---

**Experiment:**

i. Given the following circuit, calculate the parameters $\alpha$, $\omega_o$, and $\zeta$. Based on the value of $\zeta$, would this system be considered underdamped, critically damped, or overdamped?




ii. What value of $R_1 = R_2$ result in the circuit from part i being critically damped?

iii. Build the following circuit in Capture CIS Lite, with $R_1 = R_2 = 100\Omega$, and excite the circuit with a periodic pulse with a period PER = 3µs, pulse width PW = 1.5µs, rise time TR = 0, fall time TF

= 0, delay time TD = 0, lower voltage V1 = 0 and upper voltage V2 = 3. Set the simulation time to 9μs and add a trace for the current through the inductor and capacitor. Include a screenshot of the simulated currents in your report.

iv. Replace $R_1$ and $R_2$ with 220Ω resistors, and repeat the simulation, plotting the current through the inductor and capacitor. How are these two current waveforms different than those in part ii? Why do you think this is the case? Include a screenshot of the simulated currents in your report.

v. What is the phase difference between the inductor and capacitor current in part ii and iii?

vi. Using the circuit from part i, with $R_1 = R_2 = 100\Omega$, trace the voltage on the 1st pin of the inductor, capacitor, or resistor (all on the same node, so all 3 are equivalent). Include a screenshot of the simulated voltage in your report.

vii. Build the circuit from part i on the breadboard with $R_1 = R_2 = 100\Omega$ and use the Analog Discovery 2 to verify the behavior of the simulated circuit. Use the same square wave input as used in the simulation. Using the oscilloscope tool, plot the voltage at the node traced in part iv, and compare to the simulated result.