Title of the experiment:

Analysis of Differentiator using eSim.

Theory :

This Operational Amplifier circuit performs the mathematical operation of Differentiation, that is it produces a voltage output which is directly proportional to the input voltages rate-of -change with respect to time. In other words the faster or larger the change to the input voltage signal, the greater the input current, the greater will be the output voltage change in response, becoming more of a spike in shape.

An ideal voltage output for the op-amp differentiator is given as:

$$Vout = Rf*C \left[\frac{dV_{in}}{dt} \right]$$

Schematic Diagram :

The circuit schematic of differentiator in eSim is as shown below:

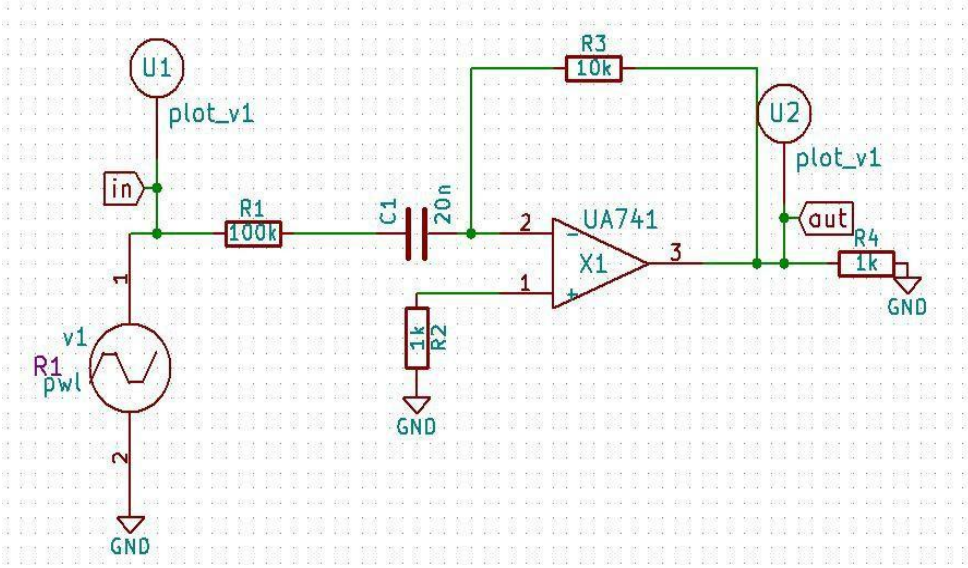

Figure 1: Differentiator

Simulation Results:

1. Python plot

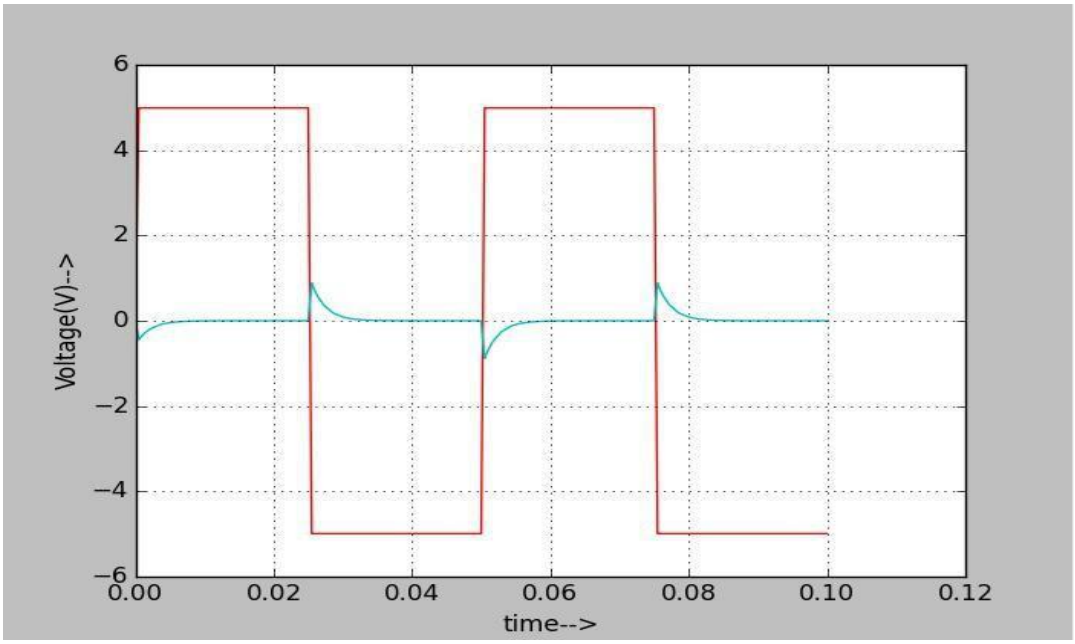

Figure 2: Python Plot

2. Ngspice plots

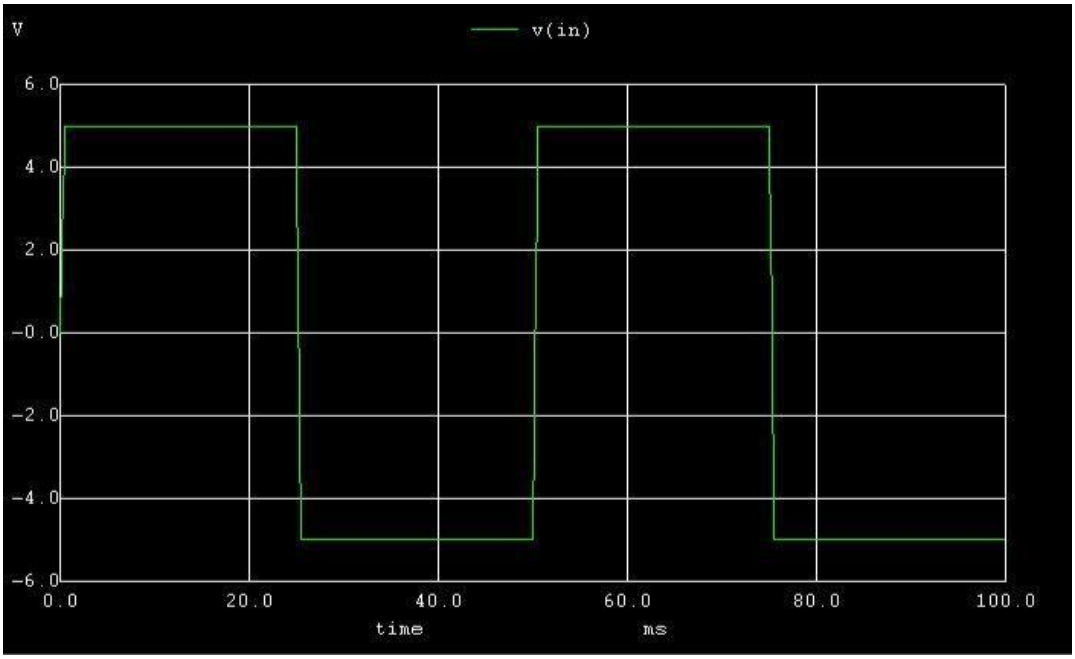

Figure 3: Ngspice Input Plot

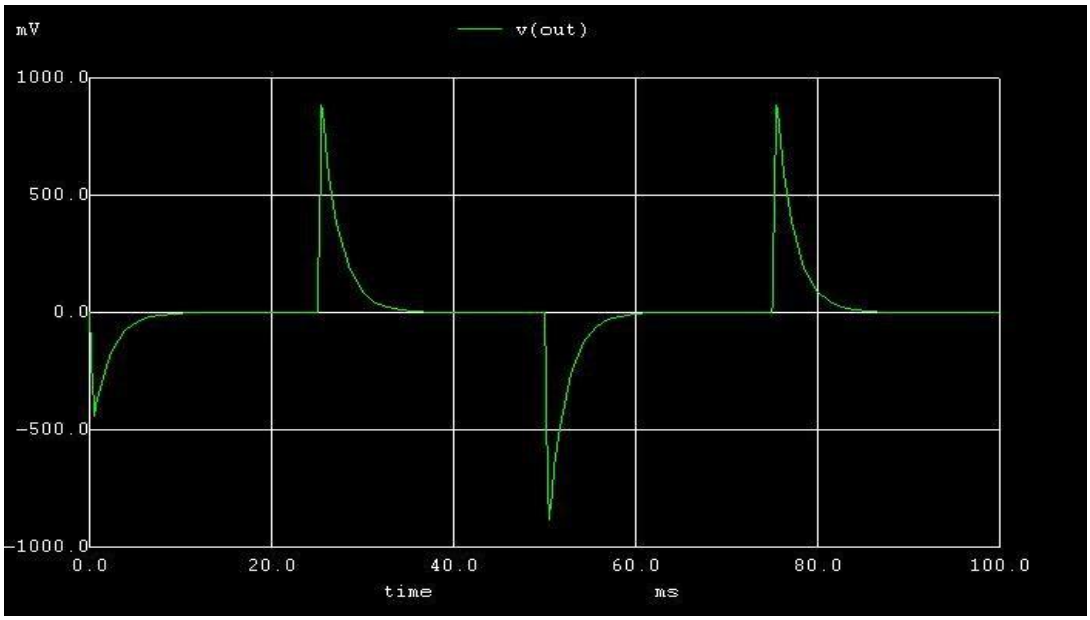

Figure 4: Ngspice Output Plot

Reference:

[1] https://www.electronicshub.org/operational-amplifier-as-differentiator/ referred on 12/10/2015