Triangular Wave Generator Using Op-Amp

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Theory:

Triangular waves are periodic, non-sinusoidal waveform with a triangular shape. A triangular wave is that it has equal rise and fall times while a sawtooth wave has unequal rise and fall times. To generate a triangular waveform, a square wave is passed through an integrator.
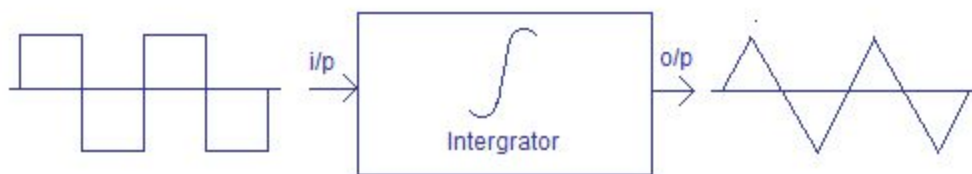

Figure: Generation of Triangular Waveform

Hence the main part of the circuit consist of:

1. A square wave generator
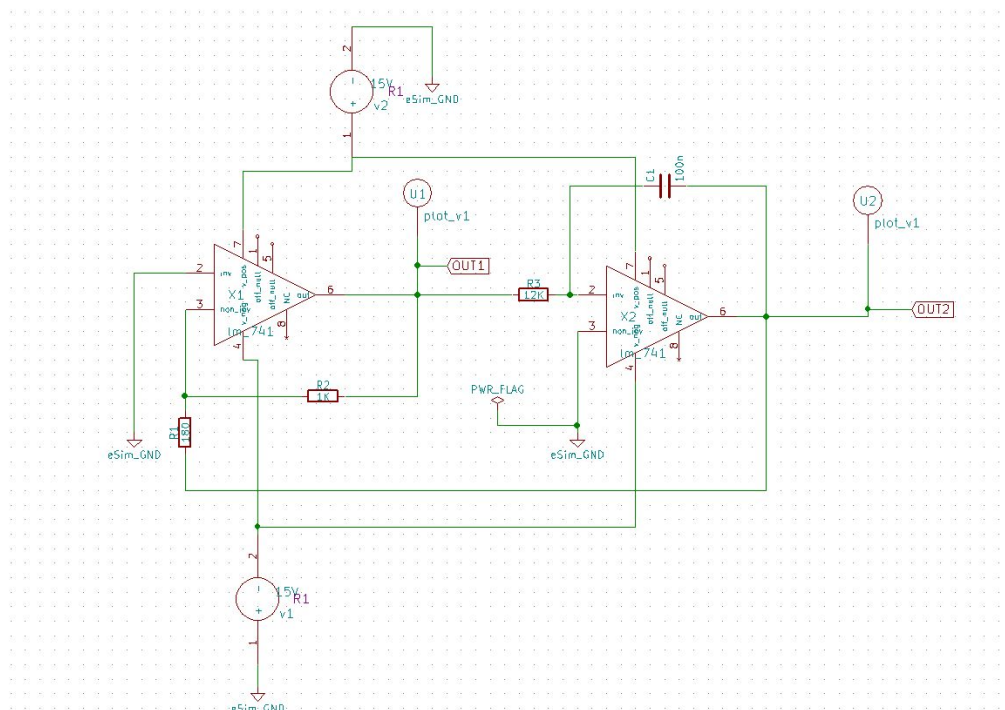2. An integrator which converts the square wave to a triangular waveform.

Schematic Diagram:

Figure 1: Circuit Diagram

Design:

First op-amp acts as a comparator and the second op-amp acts as an integrator.

f =R1/4R2R3C

Peak to peak amplitude of the ramp, Vopp = 2 (R2/R1)Vsat
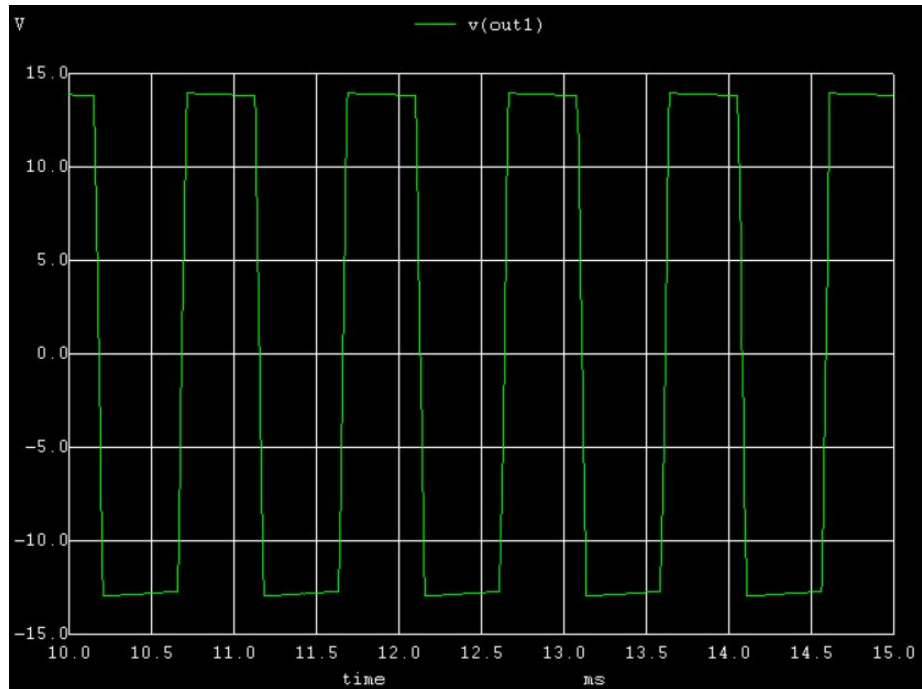
Simulation Results :
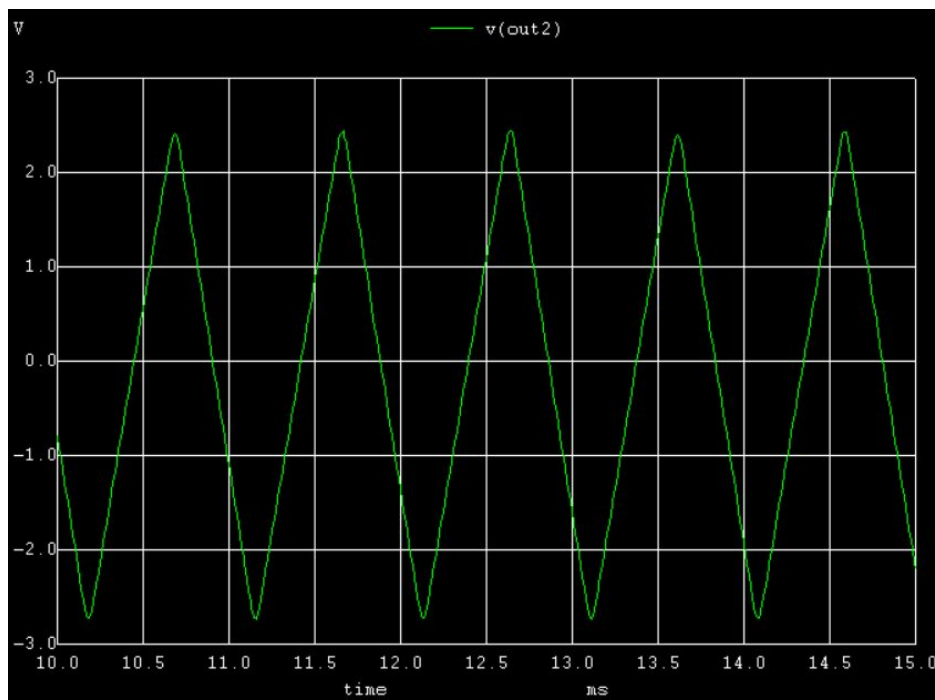
Ngspice Plots

Figure 2: Square Wave Output

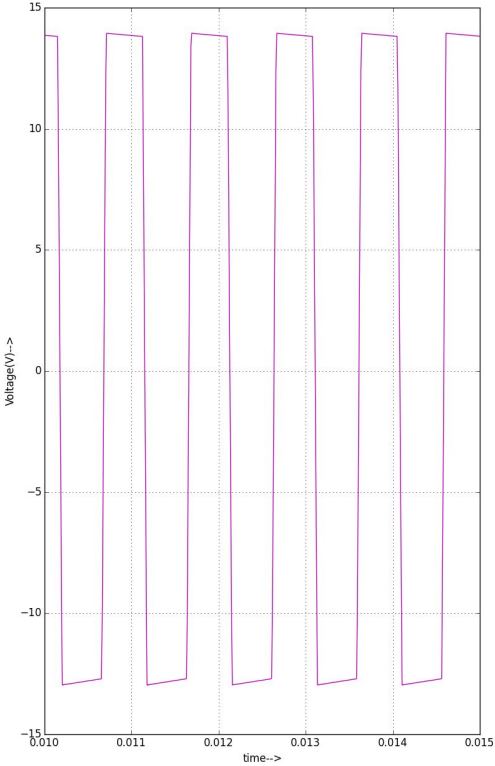**Figure 3: Triangular Wave Output**

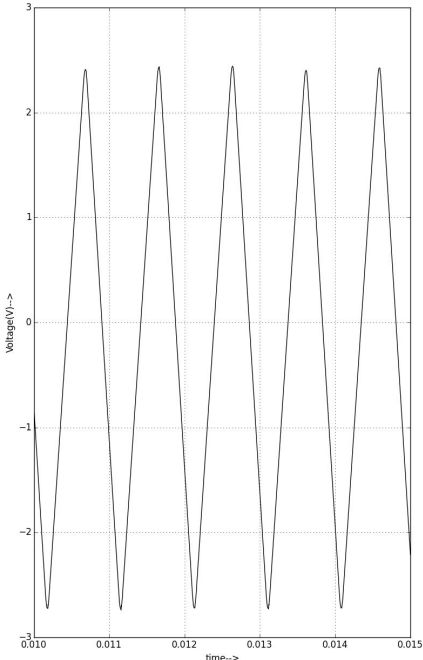**Python Plots:**

Figure 4: Square Wave Output

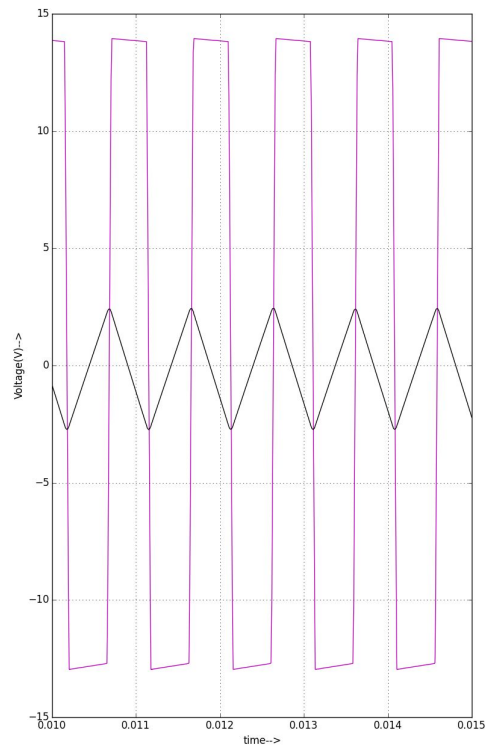
Figure 5: Triangular Wave Output

Figure 5: Square & Triangular Wave Output

Conclusion :

Designed and set up a triangular waveform generator using opamp and plotted the waveforms using esim.

Reference:

http://www.circuitstoday.com/triangular-wave-generator