



## Circuit Simulation Project

<https://esim.fossee.in/circuit-simulation-project>

**Title of the project:** DESIGN AND ANALYSIS OF A Function Generator Using IC 741 Op-Amp in eSIM

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### Objective :

The aim is to generate basic periodic signals (square and triangular waves) using op-amp circuits, useful for testing, measurement, and educational experiment in eSim software.

### Theory :

This project presents the design and analysis of a Function Generator Using IC 741 Op-Amp in eSim simulation software. Function generator system can be readily synthesized using operational amplifiers on approach which is use full when the need for a special purpose generator arises or when a function generator is inconvenient or prohibited by cost consideration. The basic wave shapes produced by most function generators are square wave & triangular wave. These can be shaped by non linear amplifiers of other wave forms, including a sinusoidal waveforms.

The results demonstrate that eSim provides reliable simulation accuracy while offering advantages like ease of design modification, cost of reduction and accesbilty. By successfully migrating the Function Generator circuit using eSim, this project enhances the open-source electronics design ecosystem and serves as a valuable resource for researchers and students in function generating studies.

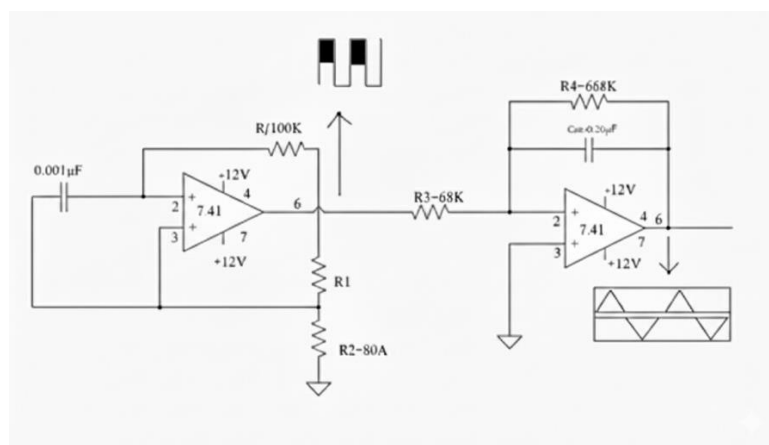


Fig 1 : This circuit illustrates the of Function Generator Using IC 741 Op-Amp

## Simulation in eSim Software :

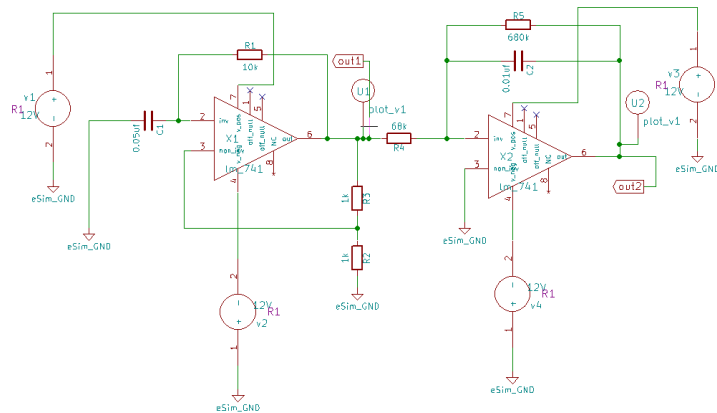


Fig 2 : Simulation of Function generator circuit in eSim

## Results of Simulation :

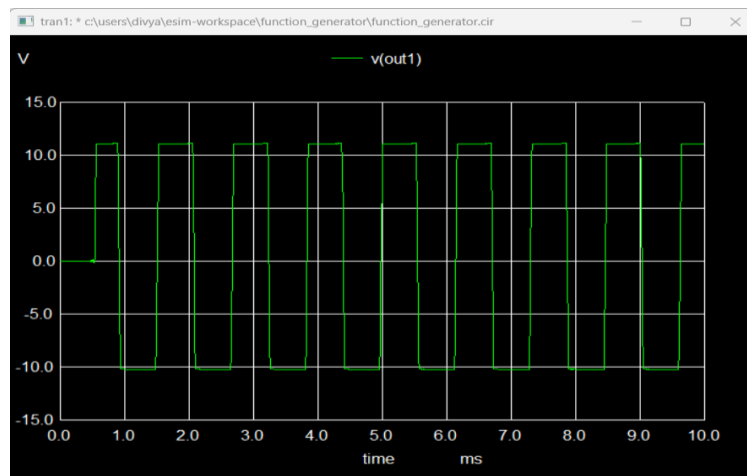


Fig 3.1 : Square wave in output result

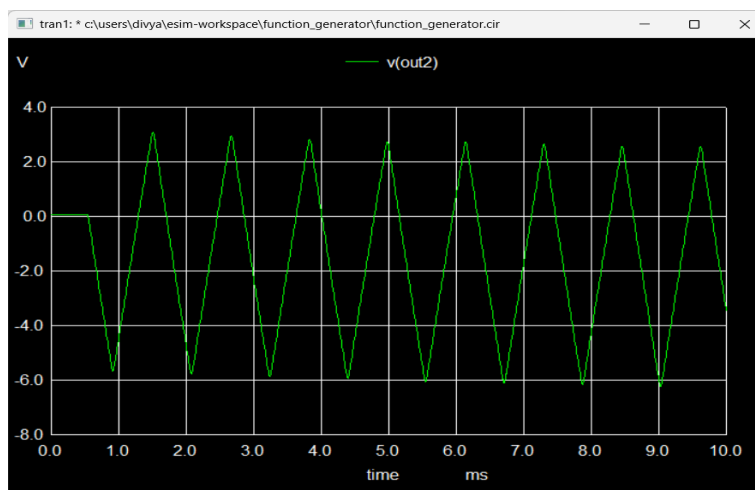


Fig 3.2 : Triangular waveform in output result

**Conclusion :**

The op-amp based function generator was designed and tested to produce square and triangular waveforms. A Schmitt trigger stage generated the square wave, while an integrator stage converted it into a triangular wave. The output frequency and amplitude were shown to depend on the RC components used. This simple project has simulated using eSim software, making it low-cost circuit demonstrates the effectiveness of op-amps in waveform generation for testing and educational purposes.

**Source/ Reference :**

1. P. Silapan, S. Boonhong, K. Kaewkhao — “Duty-Cycle Electronically Tunable Triangular/Square Wave Generator” — *Electronics / PMC* (open access), 2022.
2. “Function Generator Using IC 741 Op-amp” / “Triangular Wave Generator with Op-Amp 741” — multiple lab notes and electronics tutorials (CircuitsGallery, CircuitSchools, lecture PDFs).
3. D. Garinto — “A novel triangular wave quadrature oscillator without passive components” — Aalto University / conference paper (PDF), 2023.