

Research Migration Project

<https://esim.fossee.in/research-migration-project>



The Research Migration Project is an initiative of FOSSEE, IIT Bombay that promotes the use of eSim for reproducing published research circuits originally implemented using proprietary simulation tools. The objective is to migrate these validated designs to eSim to build an open source resource database.

Name of the participant : Ajithkumar M

Affiliation / Institution : Department of Electronics and communication Engineering ,Government college of Technology , Coimbatore ,Tamil Nadu ,India .

Title of the circuit : Design and Simulation of an Op-Amp Based Twin-T Sine Wave Oscillator with Amplitude Stabilization Using eSim

Theory/Description : The Twin-T oscillator is an active RC circuit designed to generate stable sinusoidal oscillations using an operational amplifier. It utilizes a Twin-T notch filter in the negative feedback path to determine the operating frequency, selectively rejecting negative feedback at the resonant frequency to allow oscillations to occur. Positive feedback applied to the non-inverting terminal establishes the necessary loop gain to self-start and sustain the oscillation upon power-up. To prevent output distortion and maintain steady-state amplitude, an anti-parallel diode network dynamically limits the gain as signal amplitude rises, resulting in a continuous, low-distortion sine wave.

Reason to reproduce with eSim : This circuit is ideally suited for reproduction in eSim because it replaces expensive proprietary software with a fully open source platform based on KiCad andNgspice.

Expected Outcome/outputs :

Self-Starting Oscillation: The circuit initiates and builds up oscillations automatically from DC power within 10 ms – 13 ms.

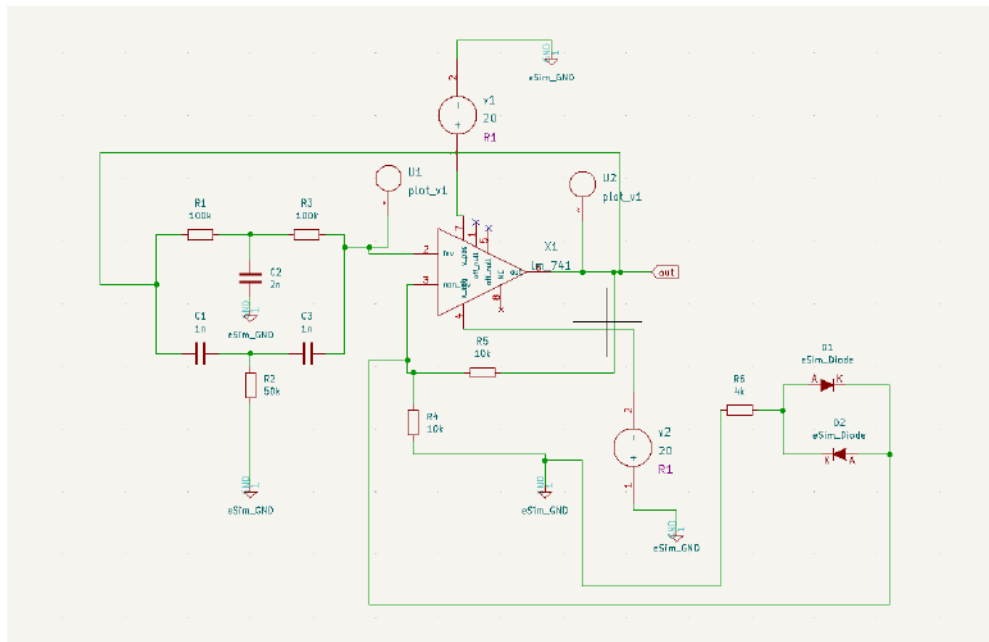
Stable Sine Wave: Generates a continuous, stable sinusoidal output without needing an external AC input.

Measurable Frequency: Produces a steady frequency of approximately 1.59 kHz ($T \approx 0.63$ ms).

Regulated Amplitude: Diode feedback limits saturation, maintaining a stable peak-to-peak voltage.

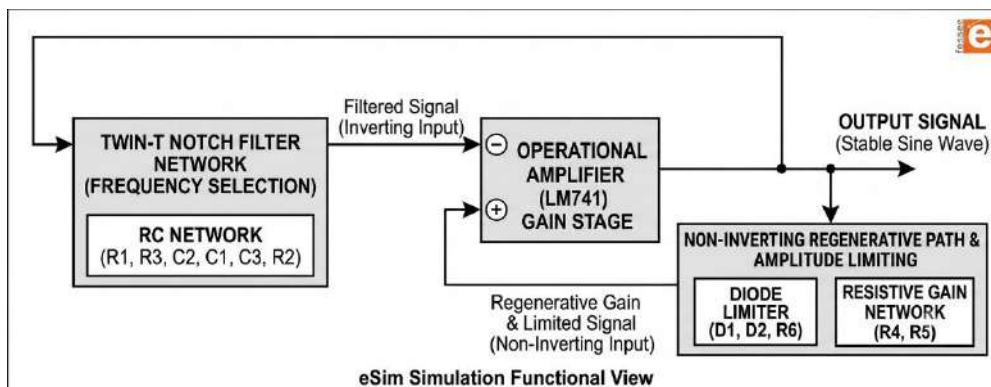
Validation: Verified by matching simulated waveform frequency and amplitude with theoretical RC design values in eSim.

Circuit Diagram(s) :

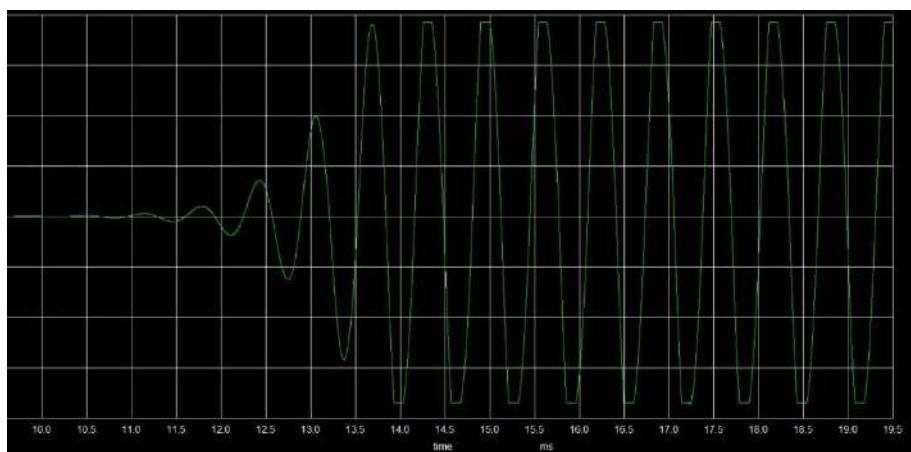


Twin T Oscillator Circuit in esim

Block Diagram (s) :



Expected Results (Input, Output waveforms and/or Multimeter readings) :



Expected sine wave output with desired frequency

Research Paper/Journal/etc. :

I referred this research paper to simulate this circuit .

Title : Twin-T Network Oscillator Based on Known Memristors

Author : [Leixin Zhang](#) , Xiamen University of Technology, Xiamen, China

[Xuefang Xiao](#), Xiamen University of Technology, Xiamen, China

Link : <https://ieeexplore.ieee.org/document/10704244>

Source/Reference(s) :

I referred this text book to understand the basic working of Op- amp and oscillator working .

Textbook : Design of Analog CMOS Integrated Circuits by Behzad Razavi
