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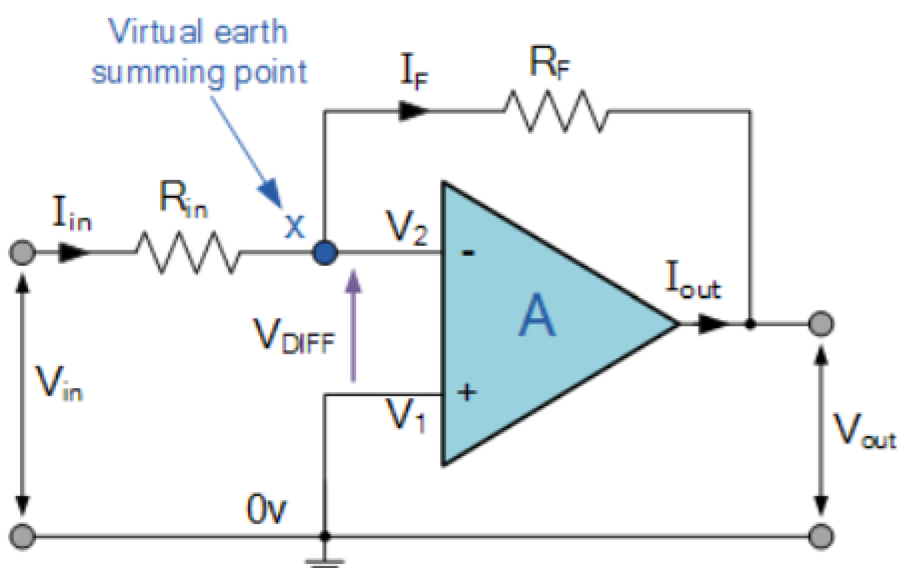
EXPERIMENT 1

AIM

To simulate the output of an inverting amplifier from a sinusoidal input.

THEORY

In this Inverting Amplifier circuit the operational amplifier is connected with feedback to produce a closed loop operation. When dealing with operational amplifiers there are two very important rules to remember about inverting amplifiers, these are: “No current flows into the input terminal” and that “V1 always equals V2”. However, in real world op-amp circuits both of these rules are slightly broken.



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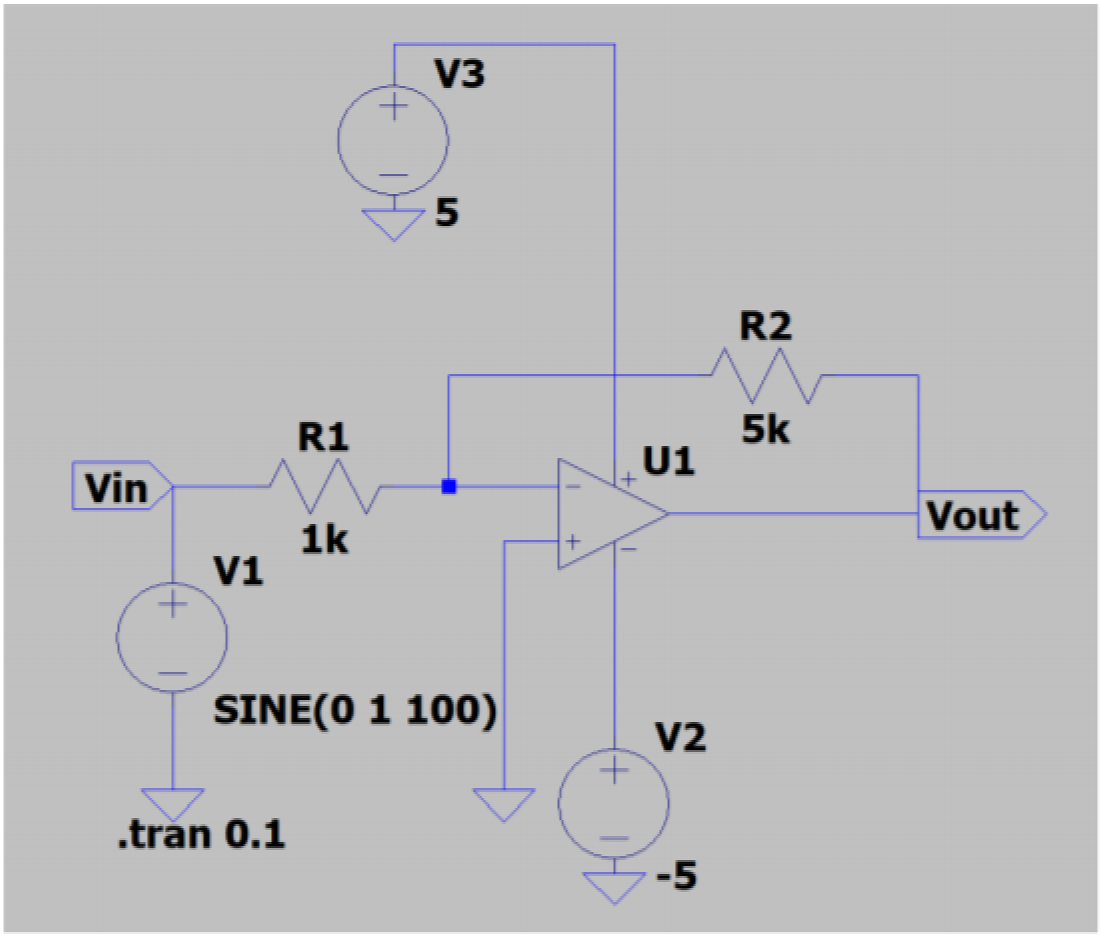
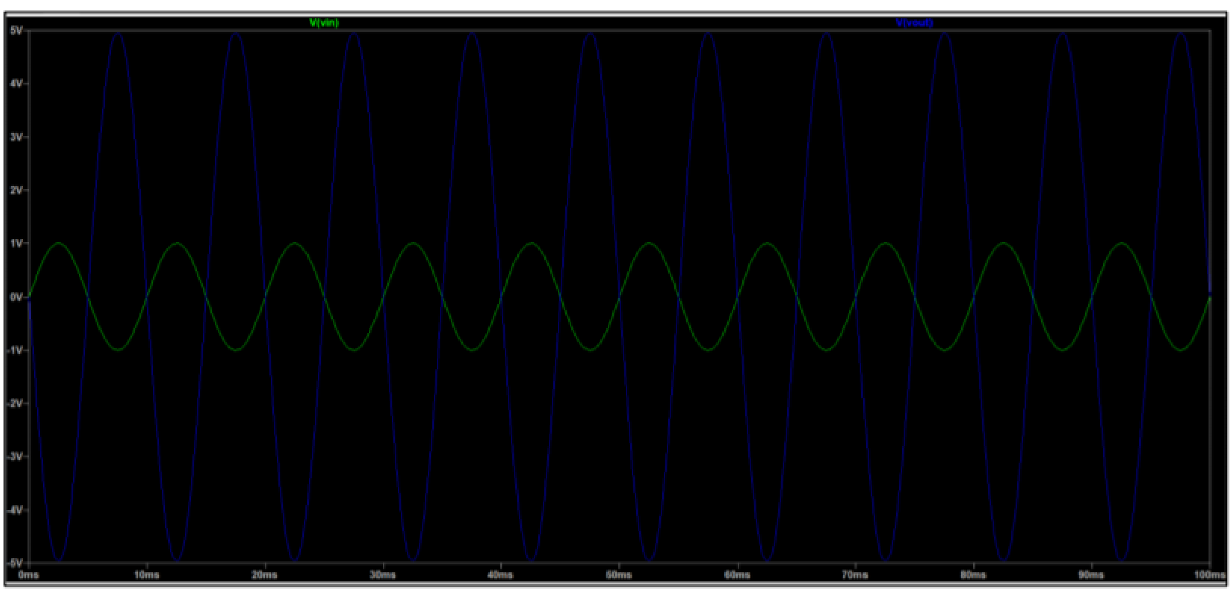
OBSERVATIONS





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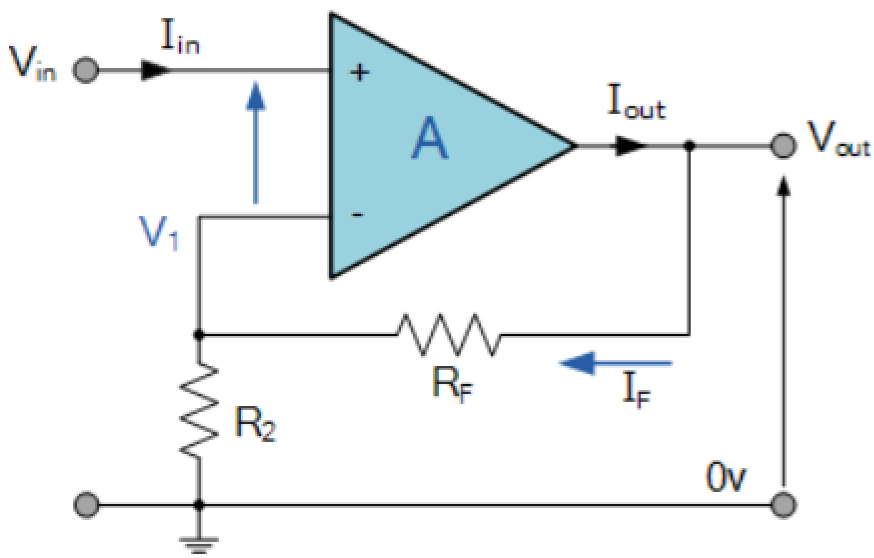
AIM

To simulate the output of a non-inverting amplifier from a sinusoidal input.

THEORY

In this configuration, the input voltage signal, (VIN) is applied directly to the non-inverting (+) input terminal which means that the output gain of the amplifier becomes "Positive" in value in contrast to the "Inverting Amplifier" circuit we saw in the last tutorial whose output gain is negative in value. The result of this is that the output signal is "in-phase" with the input signal.



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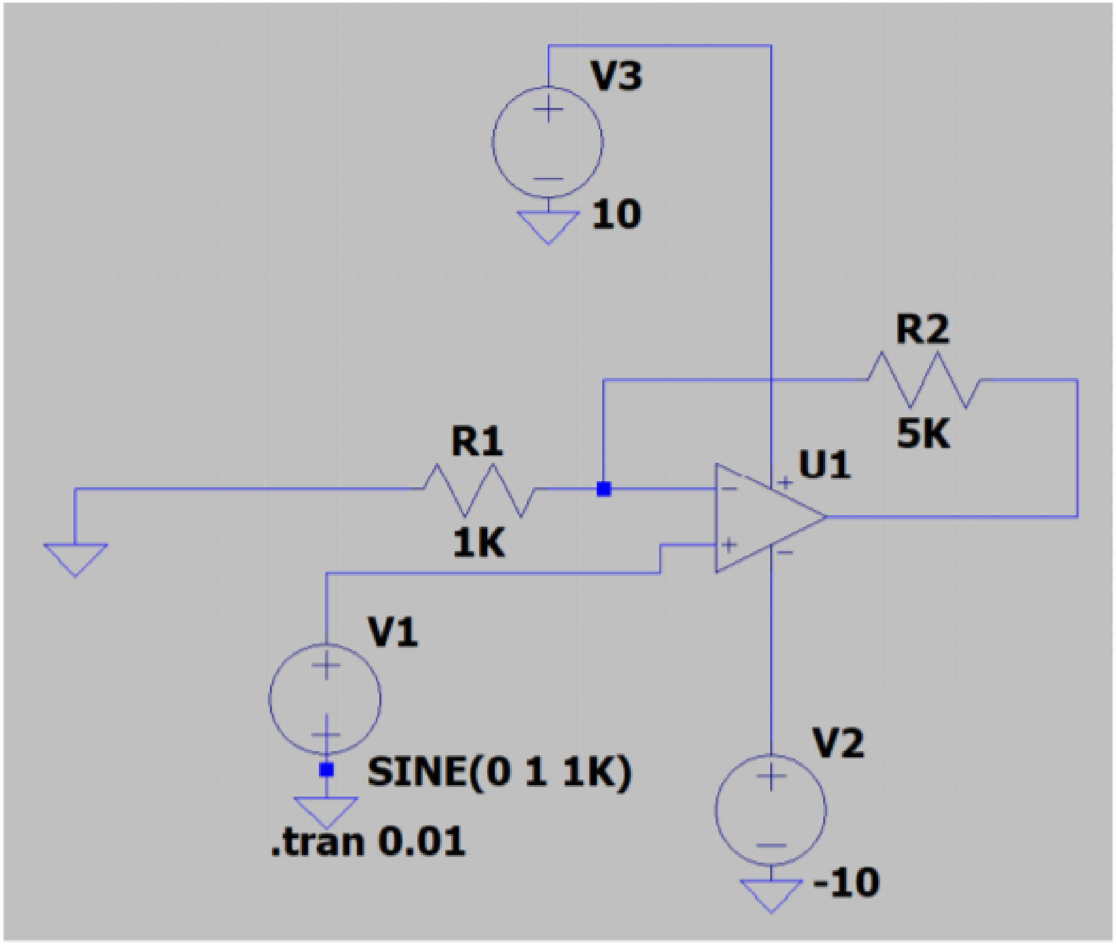

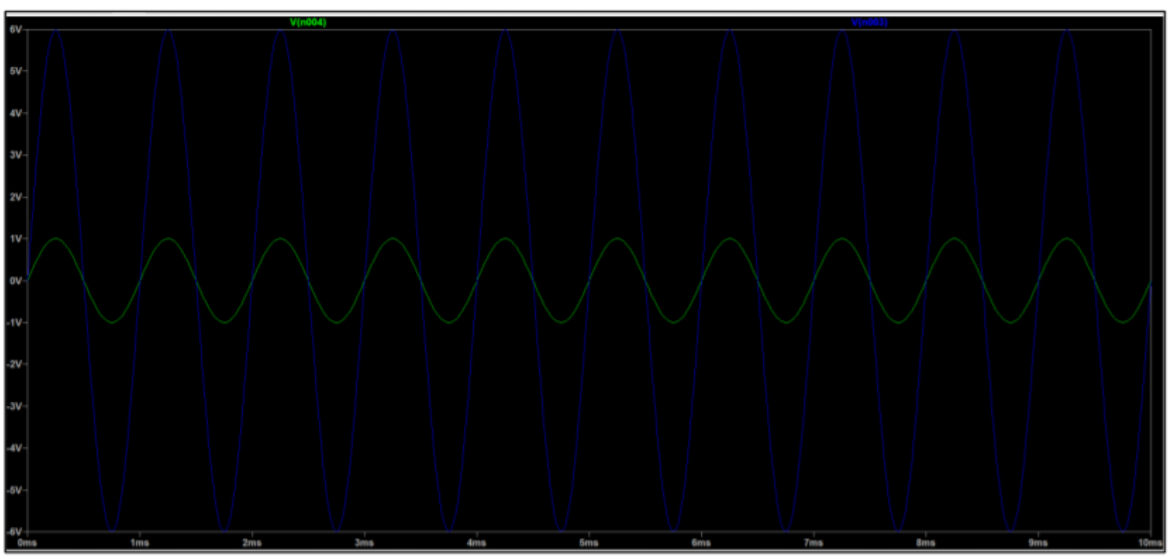

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EXPERIMENT 2

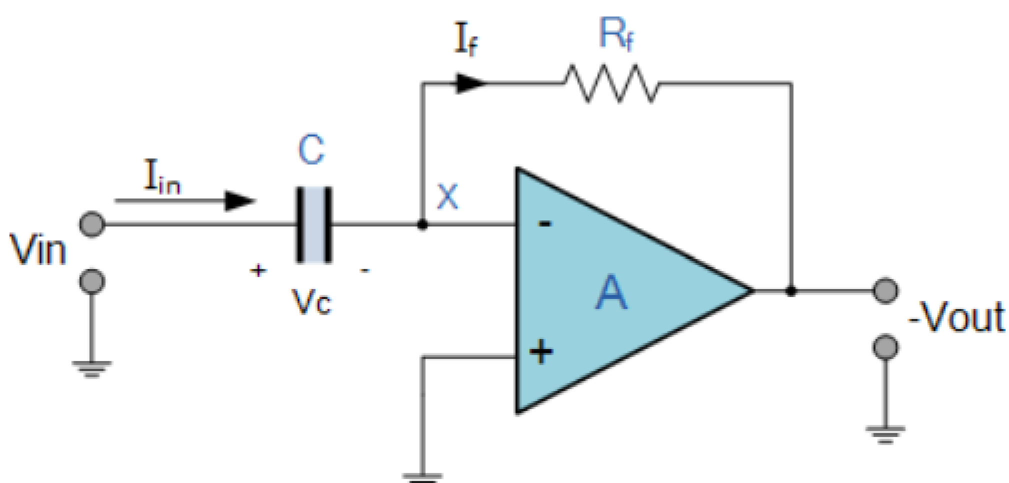
AIM

To simulate the output of a Differentiator amplifier from a sinusoidal input.

THEORY

The input signal to the differentiator is applied to the capacitor. The capacitor blocks any DC content so there is no current flow to the amplifier summing point, X resulting in zero output voltage. The capacitor only allows AC type input voltage changes to pass through and whose frequency is dependent on the rate of change of the input signal.

At low frequencies the reactance of the capacitor is "High" resulting in a low gain (R_f/X_c) and low output voltage from the op-amp. At higher frequencies the reactance of the capacitor is much lower resulting in a higher gain and higher output voltage from the differentiator amplifier.



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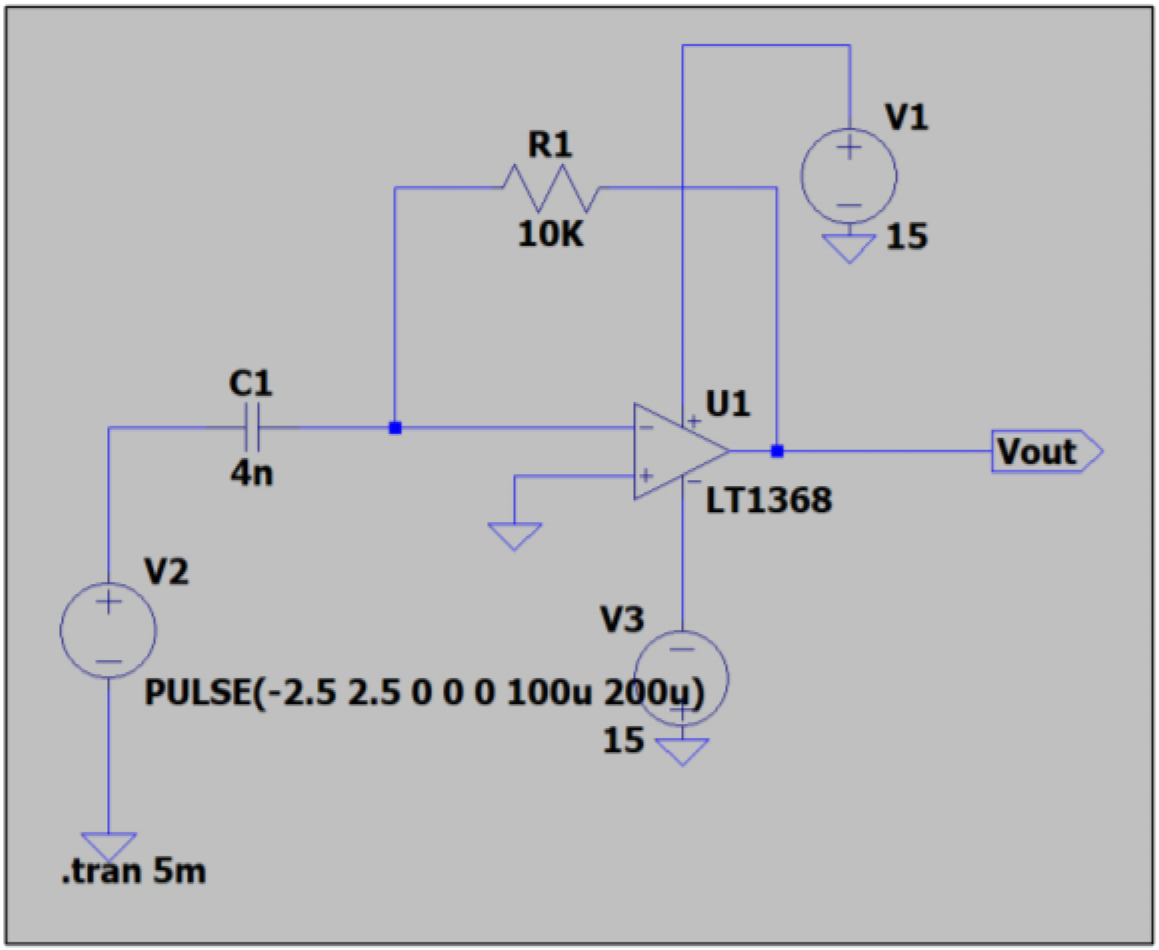

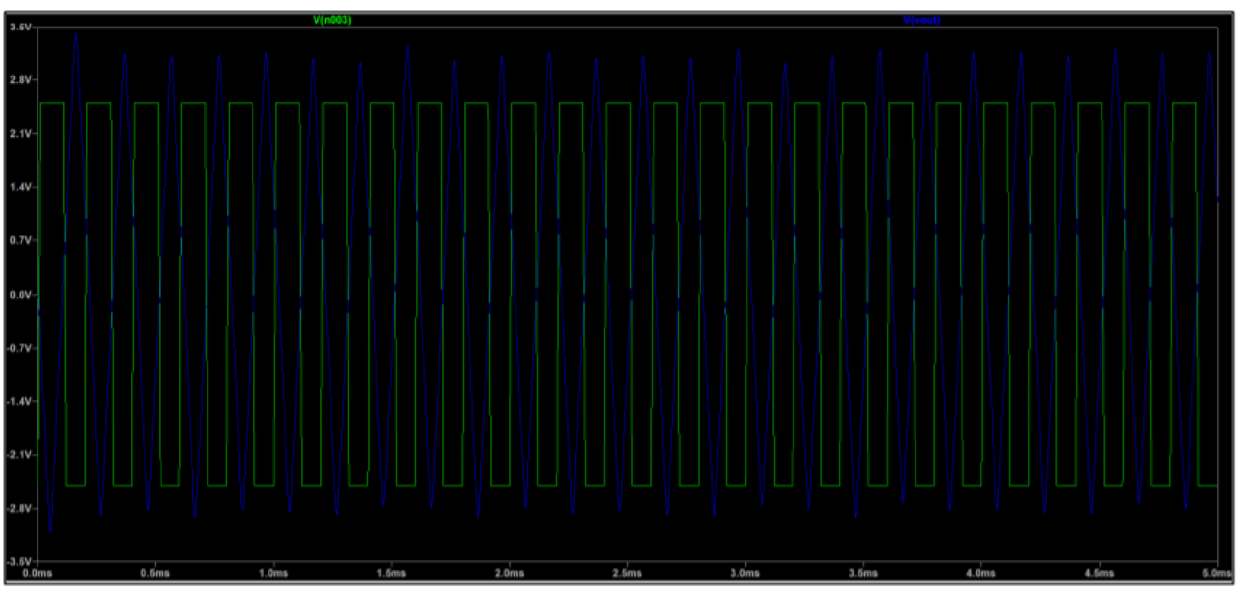

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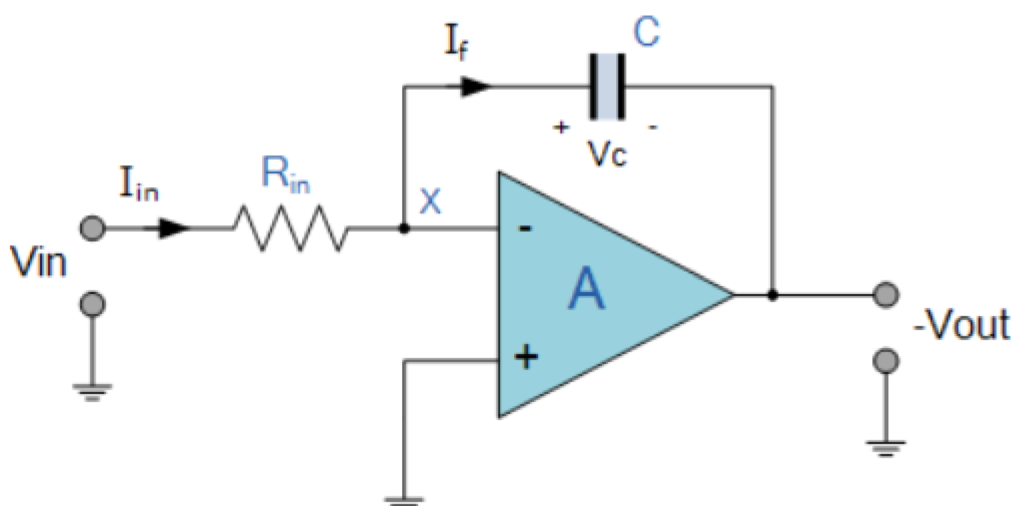
AIM

To simulate the output of an integrator amplifier from a sinusoidal input.

THEORY

As its name implies, the Op-amp Integrator is an operational amplifier circuit that performs the mathematical operation of Integration, that is we can cause the output to respond to changes in the input voltage over time as the op-amp integrator produces an output voltage which is proportional to the integral of the input voltage.

At low frequencies the reactance of the capacitor is “High” resulting in a low gain (Rƒ/Xc) and low output voltage from the op-amp. At higher frequencies the reactance of the capacitor is much lower resulting in a higher gain and higher output voltage from the differentiator amplifier.



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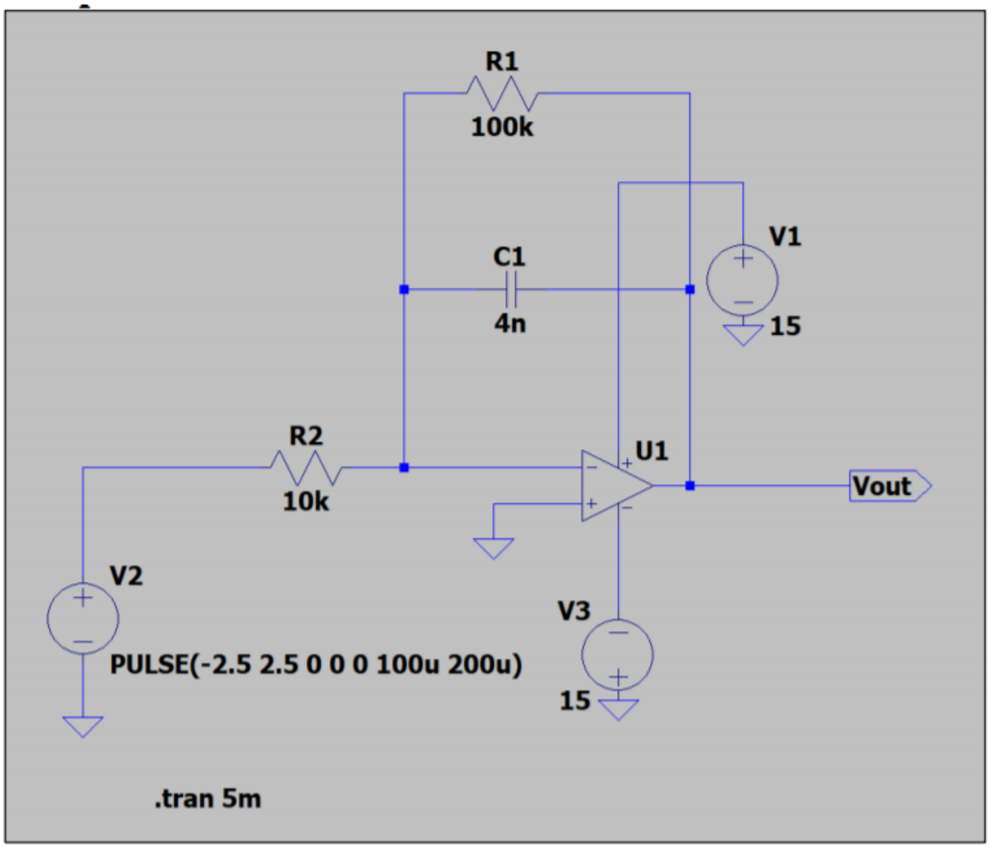

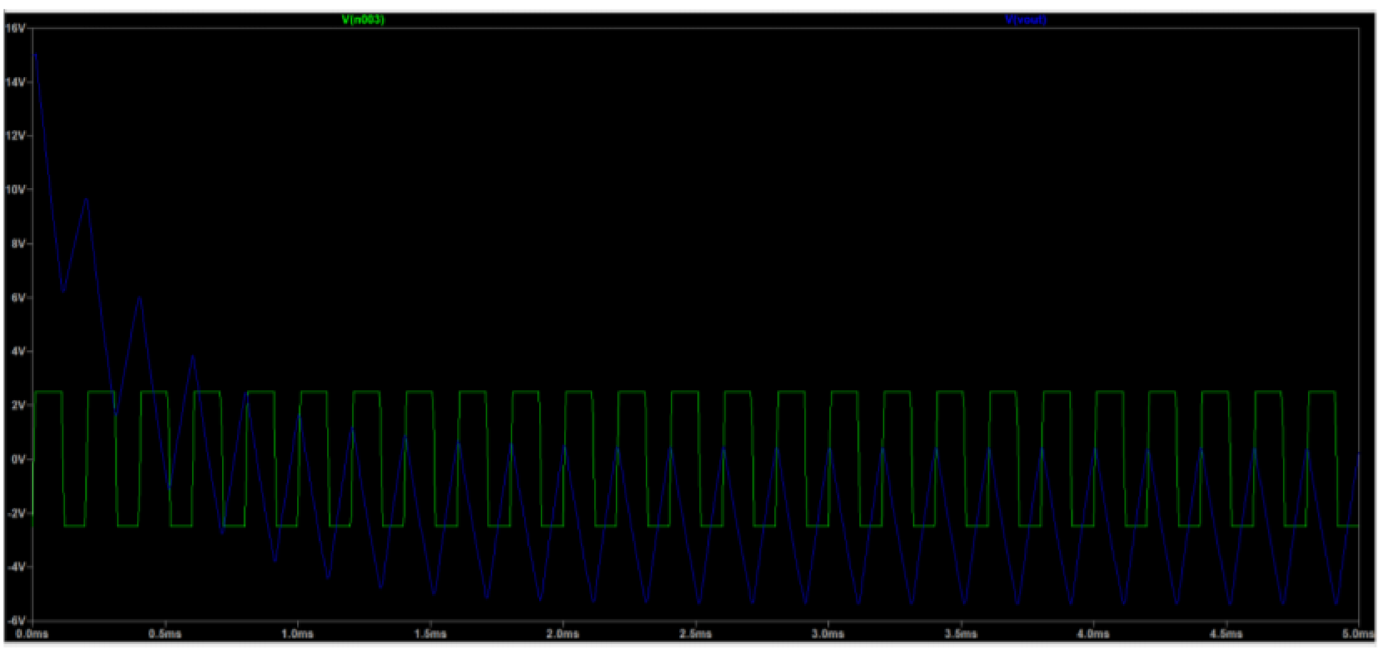

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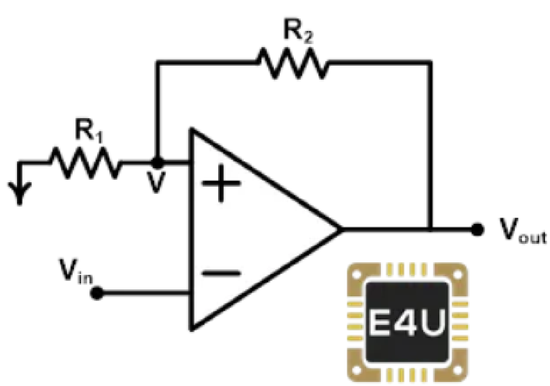
EXPERIMENT 3

AIM

To simulate the output of Schmitt trigger using op-amp from a sinusoidal input.

THEORY

In electronics, a Schmitt trigger is a comparator circuit with hysteresis implemented by applying positive feedback to the non inverting input of a comparator or differential amplifier. When the input is higher than a chosen threshold, the output is high. When the input is below a different (lower) chosen threshold the output is low, and when the input is between the two levels the output retains its value. This dual threshold action is called hysteresis and implies that the Schmitt trigger possesses memory and can act as a bistable multivibrator (latch or flip-flop). There is a close relation between the two kinds of circuits: a Schmitt trigger can be converted into a latch and a latch can be converted into a Schmitt trigger.



Inverting Schmitt Trigger

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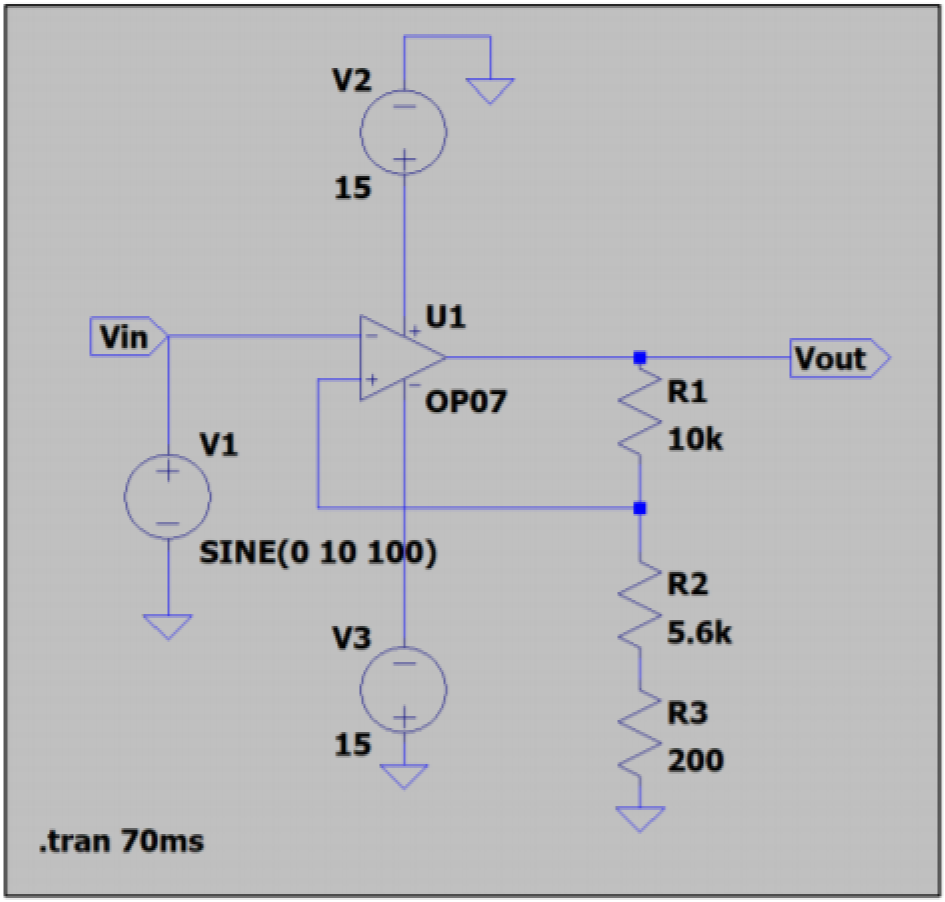

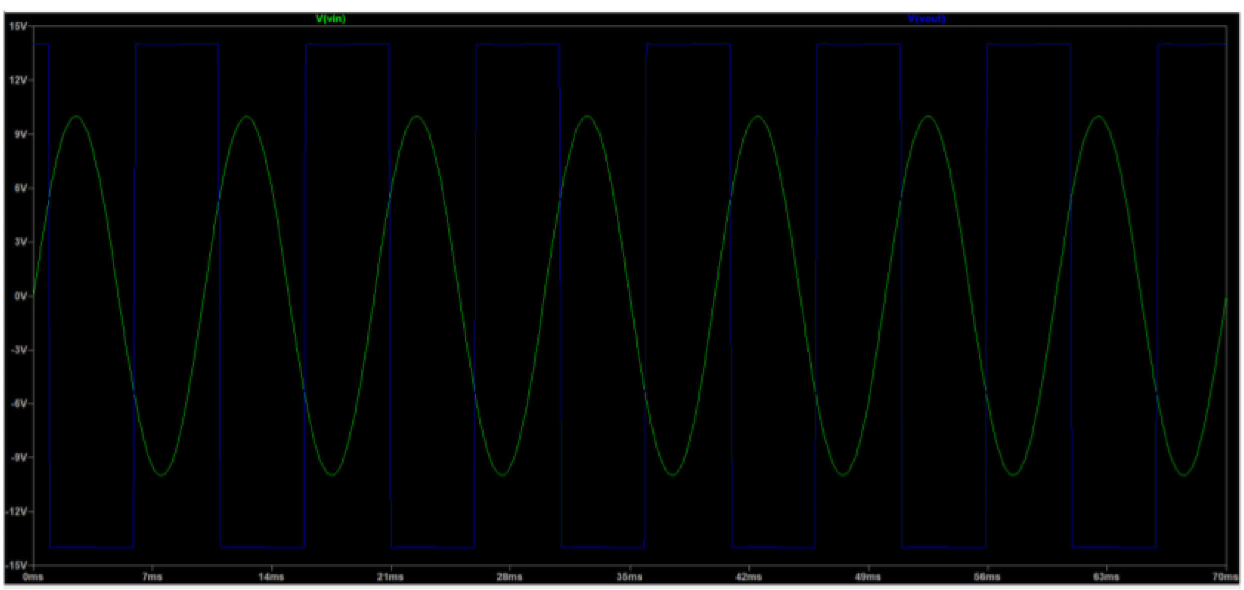

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EXPERIMENT 4

AIM

To simulate the output of an Astable Multivibrator using op-amp from a sinusoidal input.

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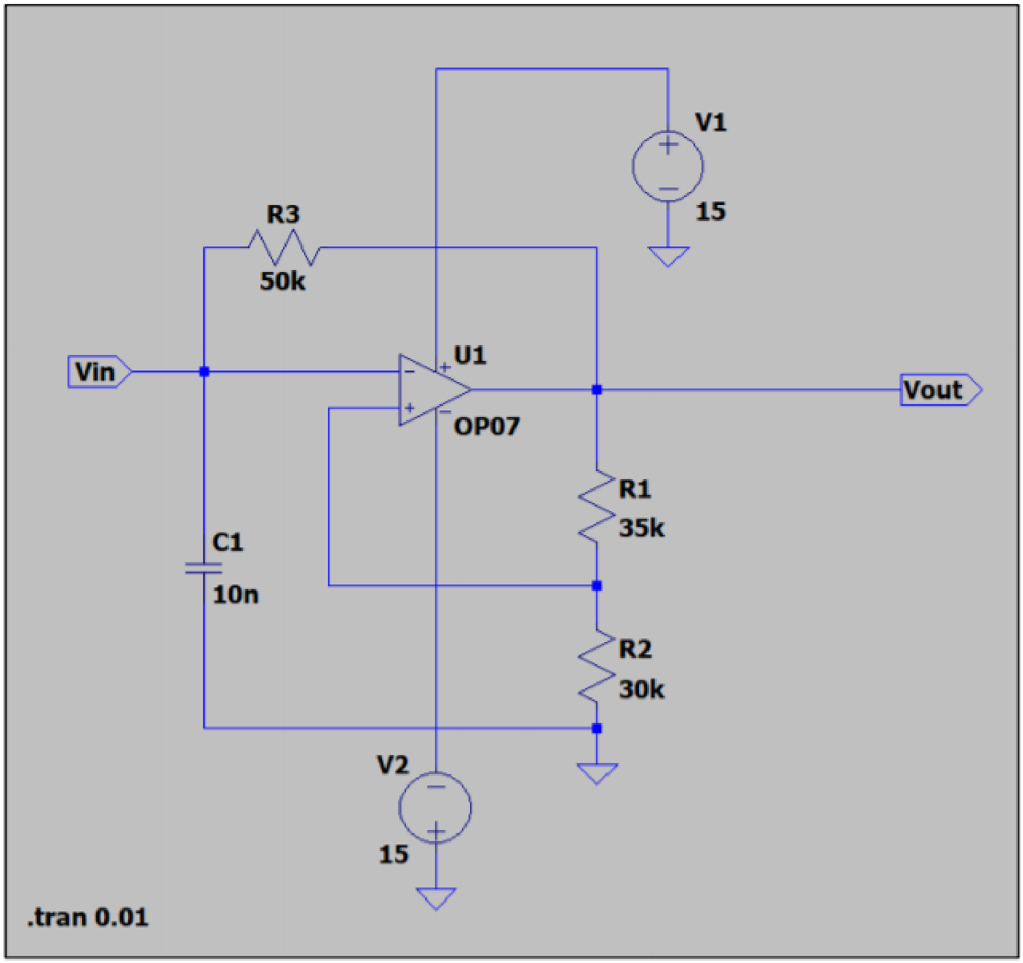

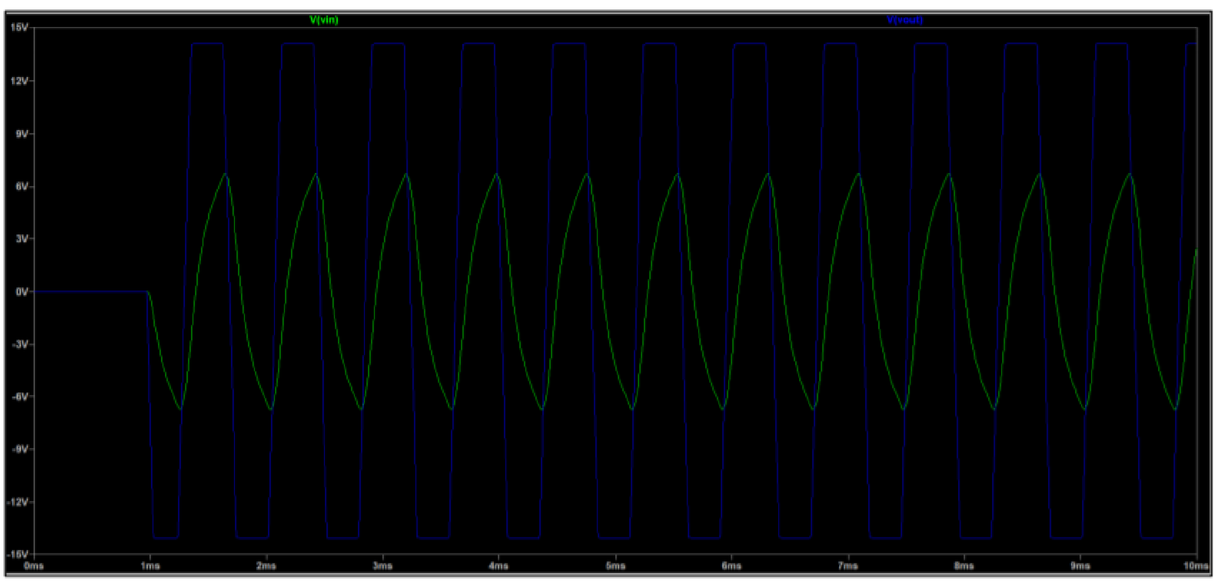

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EXPERIMENT 5

AIM

To simulate the output of the Wien Bridge Oscillator using an op-amp.

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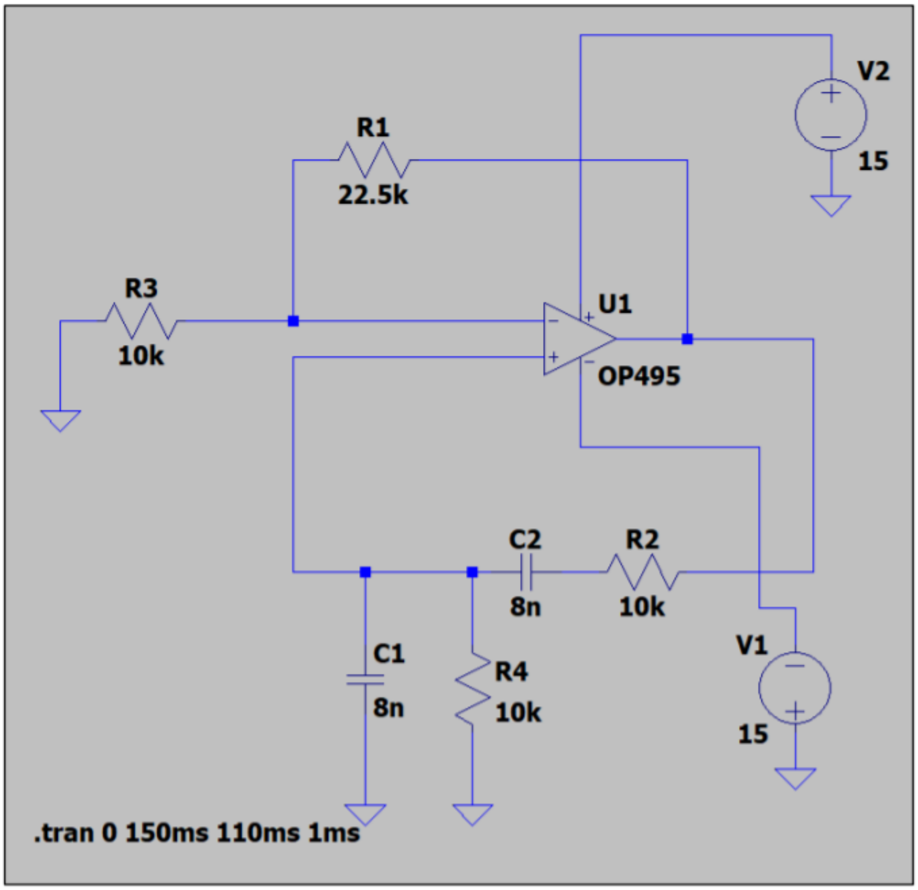

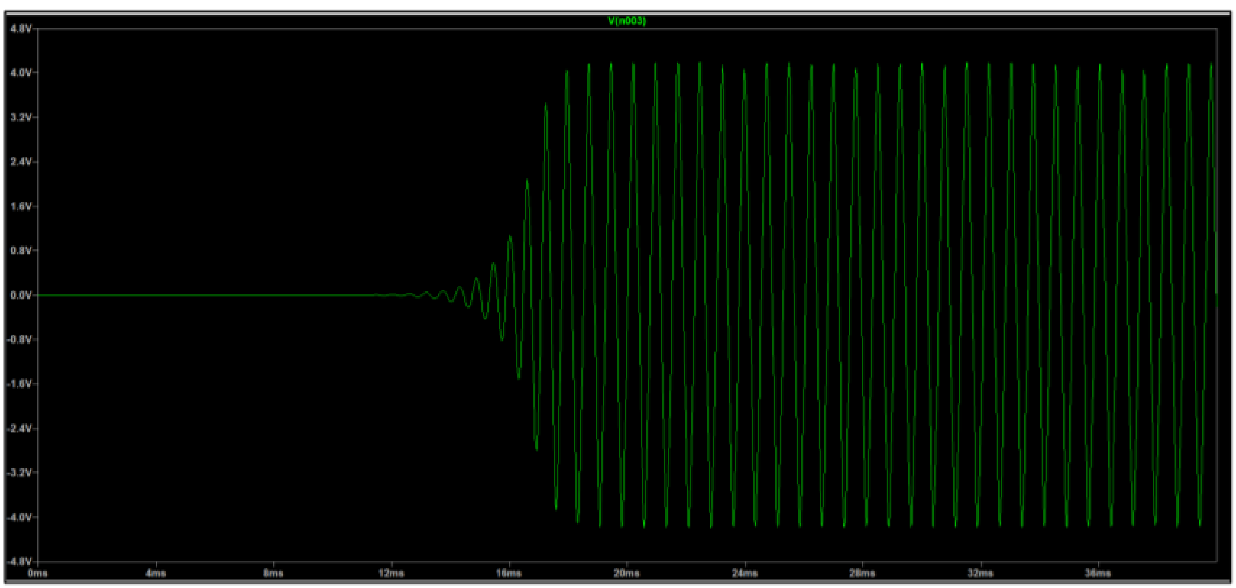

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