

Experiment No 4.

BJT Wilson Current Mirror

1. Theory:-

A current mirror is a circuit designed to copy a current through one active device by controlling the current in another active device of a circuit, keeping the output current constant regardless of loading. The current mirror is used to provide bias currents and active loads to circuits. It can also be used to model a more realistic current source (since ideal current sources don't exist). Conceptually, an ideal current mirror is simply an ideal inverting current amplifier that reverses the current direction as well. Or it can consist of a current-controlled current source (CCCS). The Wilson mirror solves the Early effect voltage problem in this design. There are three main specifications that characterize a current mirror. The first is the transfer ratio (in the case of a current amplifier) or the output current magnitude (in the case of a constant current source CCS). The second is its AC output resistance, which determines how much the output current varies with the voltage applied to the mirror. A Wilson current mirror is a three-terminal circuit (Fig. 1) that accepts an input current at the input terminal and provides a "mirrored" current source or sink output at the output terminal. If the output of the Wilson mirror is connected to a relatively high impedance node, the voltage gain of the mirror may be high. In that case the input impedance of the mirror may be affected by the Miller Effect, although the low input impedance of the mirror mitigates this effect. For the current feedback loop of the Wilson current mirror this effect appears as a strong broad resonant peak in the ratio of the output to input current.

2. Schematic Diagram:-

The schematic diagram of BJT Wilson Current mirror circuit in eSim is as follows,

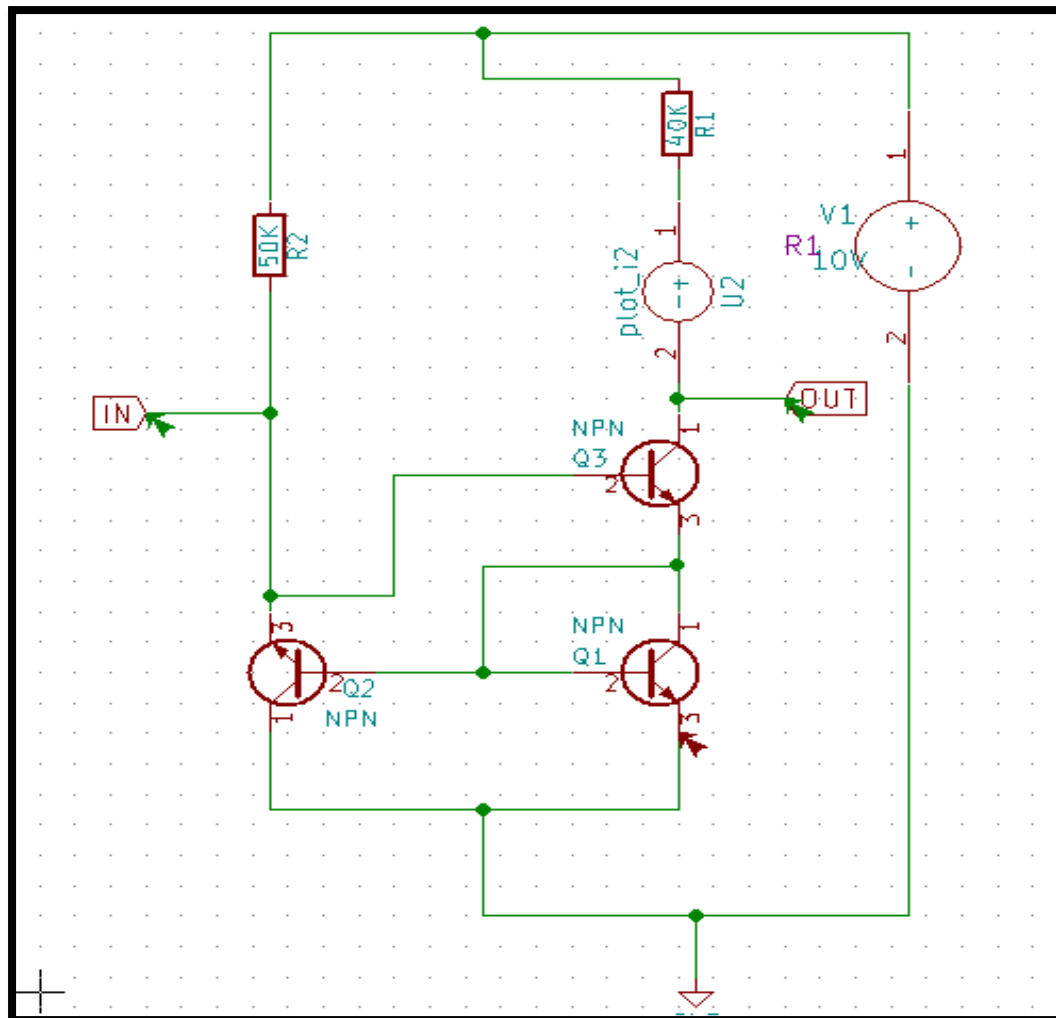


Figure 1. Schematic Diagram of BJT Wilson current mirror

3. Simulation Results:

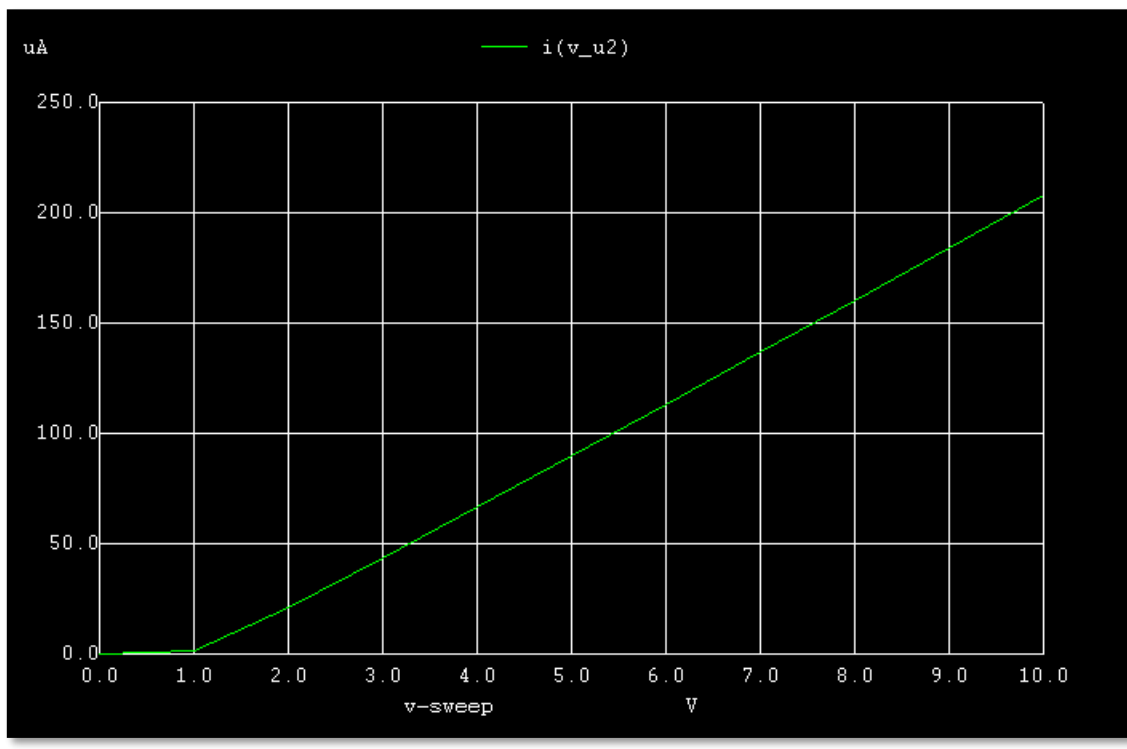


Figure 2: Ngspice Output Plot

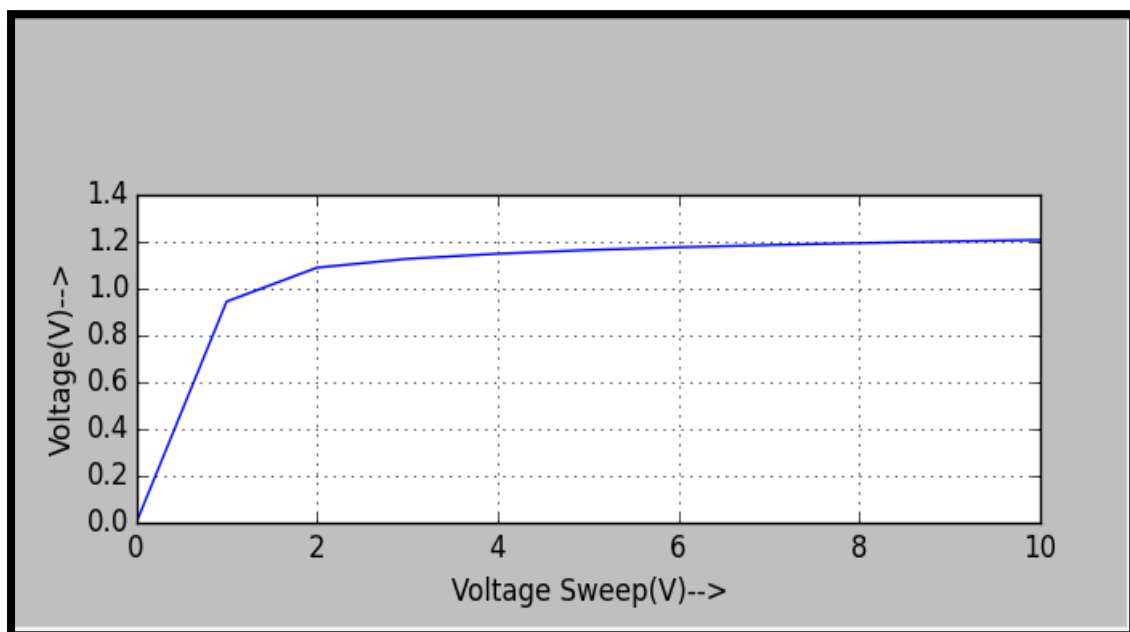


Figure 3: Python input Plot

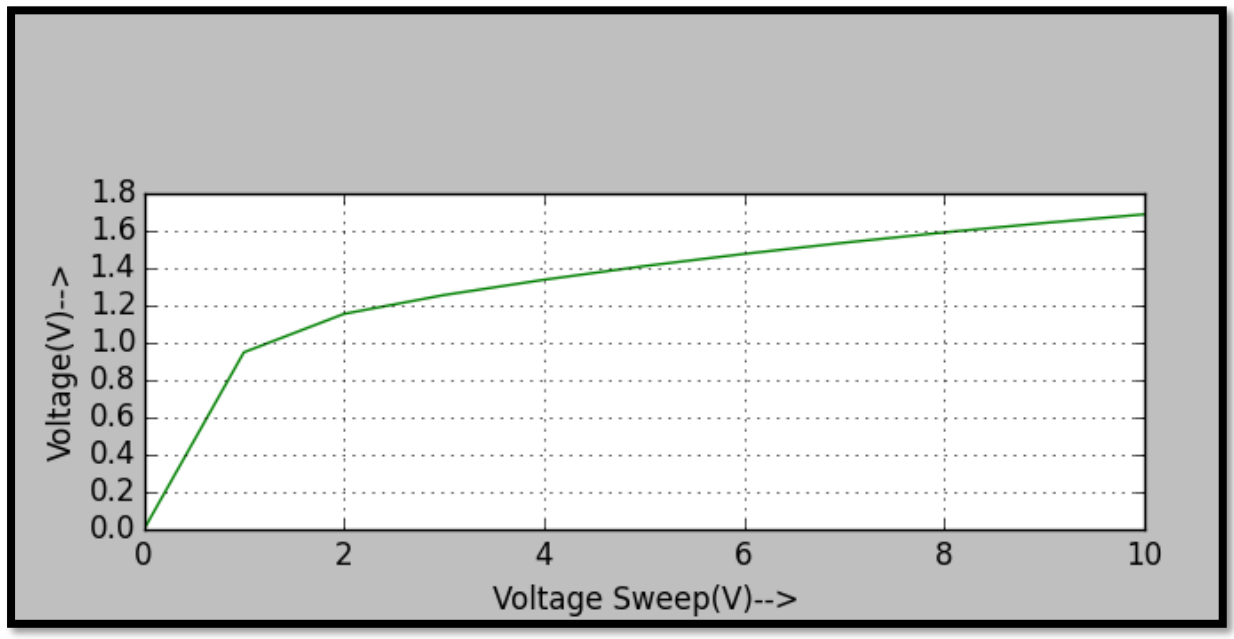


Figure 4: Python Output plot

4. **Conclusion :-** Thus we have studied BJT Wilson current mirror circuit using eSim and got the appropriate wave forms.

5. **Reference:-**

<https://electronics.stackexchange.com/questions/187473/wilson-current-mirror-analysis>.

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