Design for Analog Circuits - Laboratory Report

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Assignment 5

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Contents

1 Classical Rectifier **1**
1.1 Aim 1
1.2 Schematic 1
1.3 Transient Simulation Results 1

2 Precision Rectifier **2**
2.1 Aim 2
2.2 Schematic 2
2.3 Transient Simulation Results 2

3 Conclusions **3**

List of Figures

1 LTSpice Schematic of Classical rectifier 1
2 Transient simulation output of classical rectifier 1
3 LTSpice Schematic of Precision rectifier 2
4 Transient simulation output of classical rectifier 3

1 Classical Rectifier

1.1 Aim

To perform transient simulation of the classical rectifier circuit and observe the outputs.

1.2 Schematic

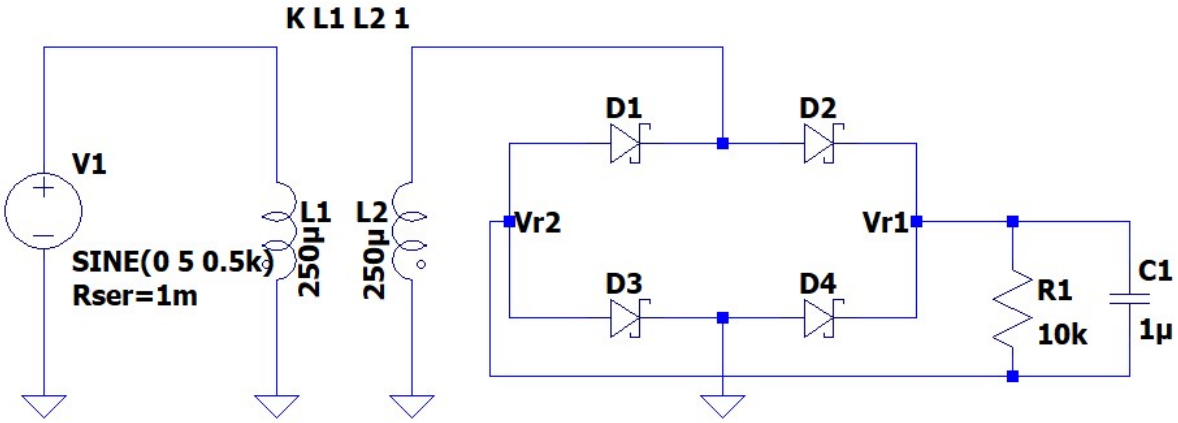

Figure 1: LTSpice Schematic of Classical rectifier

1.3 Transient Simulation Results

The figure 2 below shows the transient simulation results (input voltage, output voltage and voltage across diode D_1 respectively) with 5 V, 500 Hz sinewave input.

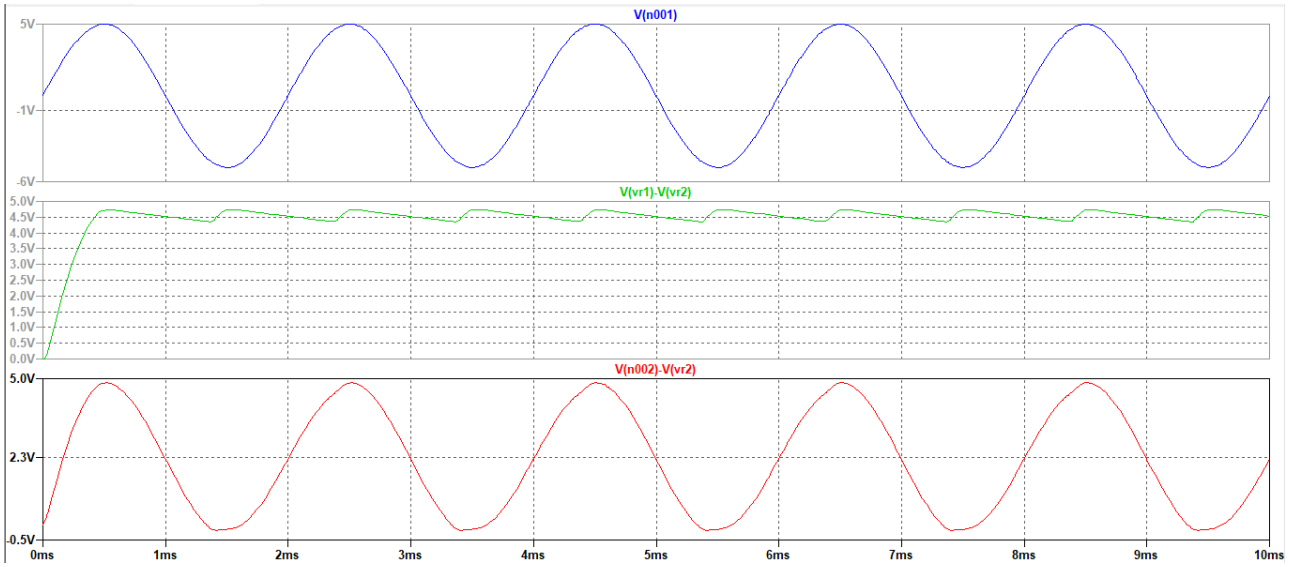

Figure 2: Transient simulation output of classical rectifier

We get a DC output of 4.556 V and a peak-to-peak ripple of 0.395 V.

2 Precision Rectifier

2.1 Aim

To perform transient simulation of the precision rectifier circuit and observe the outputs.

2.2 Schematic

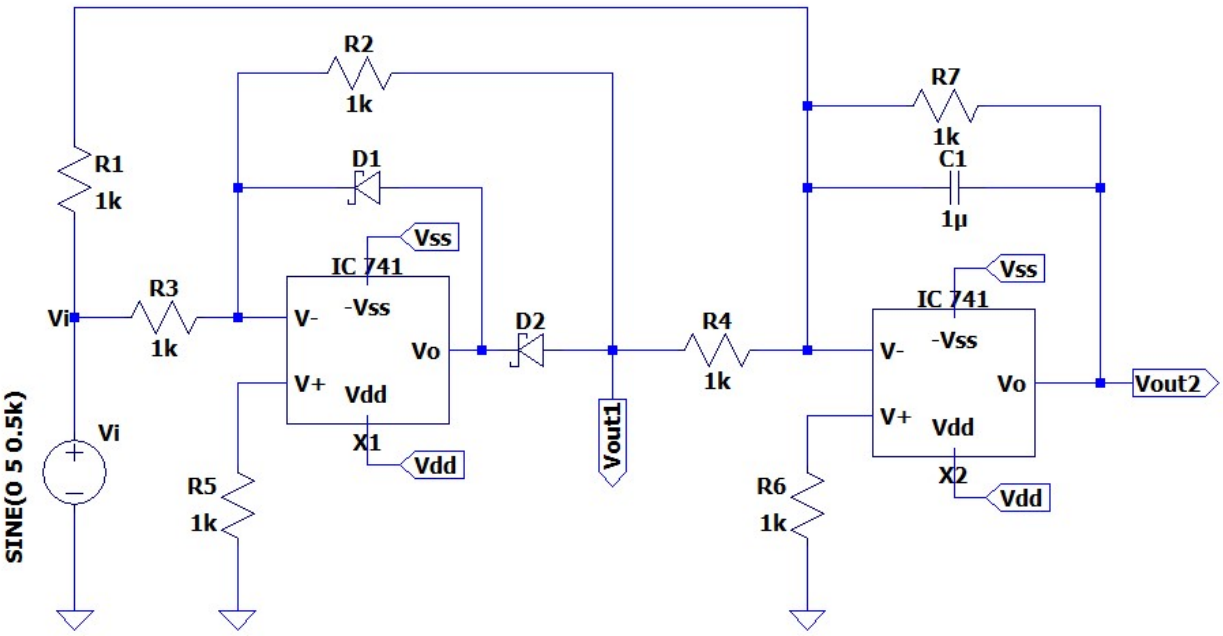

Figure 3: LTSpice Schematic of Precision rectifier

2.3 Transient Simulation Results

The figure 4 below shows the transient simulation outputs for the precision rectifier (input voltage, V_{out1} and V_{out2} respectively) with 5 V, 500 Hz sinewave input. The peak values of V_{out1} and V_{out2} are -4.979 V and 4.996 V.

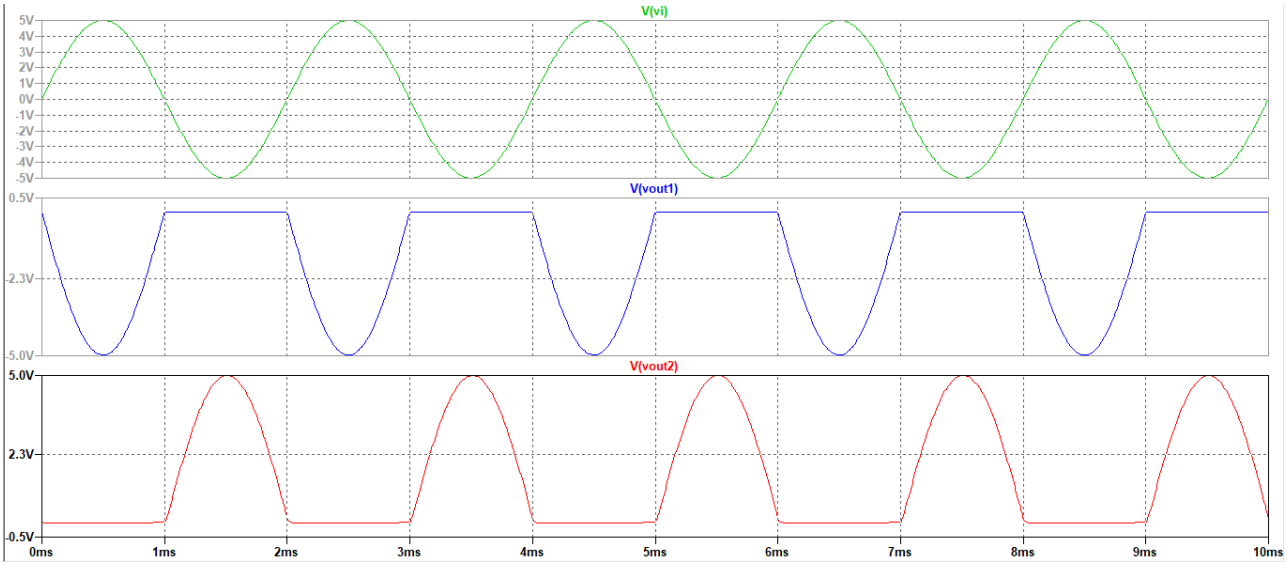

Figure 4: Transient simulation output of classical rectifier

3 Conclusions

1. The peak output voltage of the classical rectifier is 4.556 V whereas that of the precision rectifier is 4.996 V. This is because the classical rectifier output voltage gets reduced due to the voltage drops across the two diodes that come in series in both the positive and negative half cycles. The precision rectifier removes this problem by including the diode in the feedback path, for which the drop in output due to diode is reduced a lot.

2. The classical rectifier is used for driving robust and higher power loads, where the main requirement is to supply a power at a reasonably stable DC voltage; whereas the precision rectifier is used in signal applications where error due to diode drop can't be neglected (even the signal level may be lower than the diode drop). The precision rectifier can't supply large amount of power unlike the classical rectifier.