Voltage Divider Circuits

1 Introduction

This tutorial is about the basic voltage divider circuit made from two resistors connected in series to a voltage source.

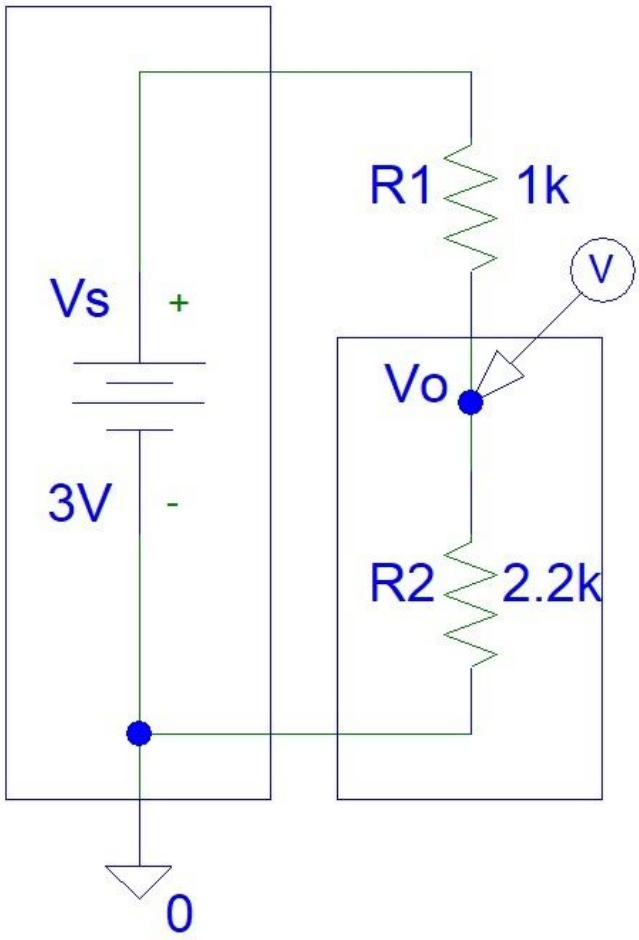

Figure 1: Voltage Divider Circuit.

2 Circuit

The output of a simple voltage divider circuit is equal to:

$$Vo1 = Vs * R1 / (R1 + R2)$$

$$Vo2 = Vs * R2 / (R1 + R2)$$

We can now calculate the output voltage of the circuit on the previous page:

$$Vo2 = 3\ V * 2.2\ kohms / (1\ kohms + 2.2\ kohms)$$

$$= 3\ V * 2{,}200\ ohms / 3{,}200\ ohms$$

$$= 2.0625\ V$$

Simulations show that the predicted value is very similar to plotted voltage in the graph below:

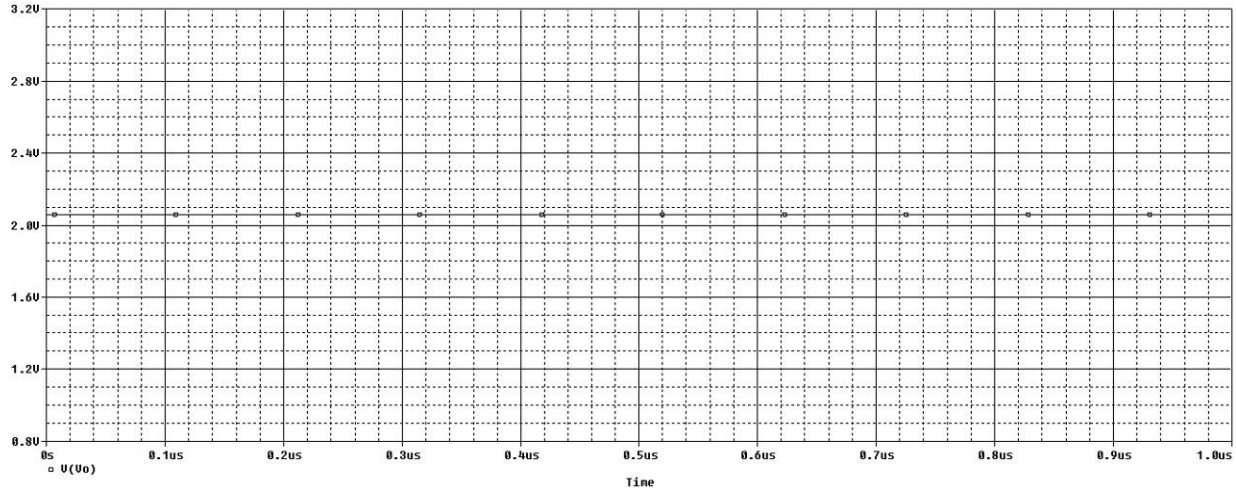

Figure 2: Voltage Divider Circuit Simulations.

Adding a third resistor will add an additional potential voltage:

$$Vo1 = Vs * R1 / (R1 + R2 + R3)$$

$$Vo2 = Vs * R2 / (R1 + R2 + R3)$$

$$Vo3 = Vs * R3 / (R1 + R2 + R3)$$

3 Conclusion

There are also current divider circuits when multiple resistors are connected in parallel. The voltage across those resistors will be equal. The current will be different:

$$Io1 = Vs / R1$$

$$Io2 = Vs / R2$$

$$Io3 = Vs / R3$$

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