EE 254
Project 3
11/18/13

Project 3: Schmitt Trigger

The purpos rigger using an LM741 Op-Amp to produce a unique voltage hys

In order to n test was first performed to determine the upper and lower li detection circuit was used (Figure 1), and the upper and lower li Vl=-10.9 (Figure 2).

Figure 1: Circuit used for zero crossing detection test

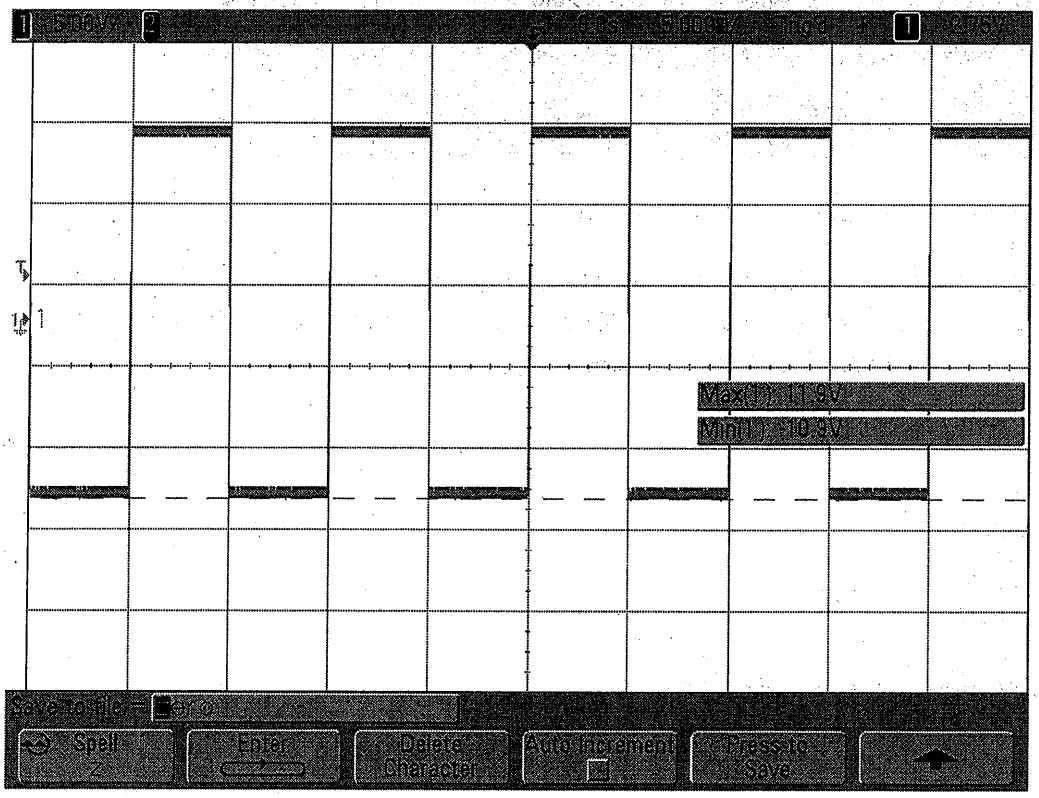

Figure 2: Vh and Vl from zero crossing test

Next, the parameters for the circuit (Figure 3) were calculated using the assigned parameters (See Calculations page). The circuit was then built and tested. The measured Vth and Vtl were -1.511 V and 4.5337V respectively, which were fairly close to the calculated values. Vref had to be lowered to 1.8V in order to get this hysteresis, which was a drop of 0.7V. This hysteresis can be seen in figure 4.

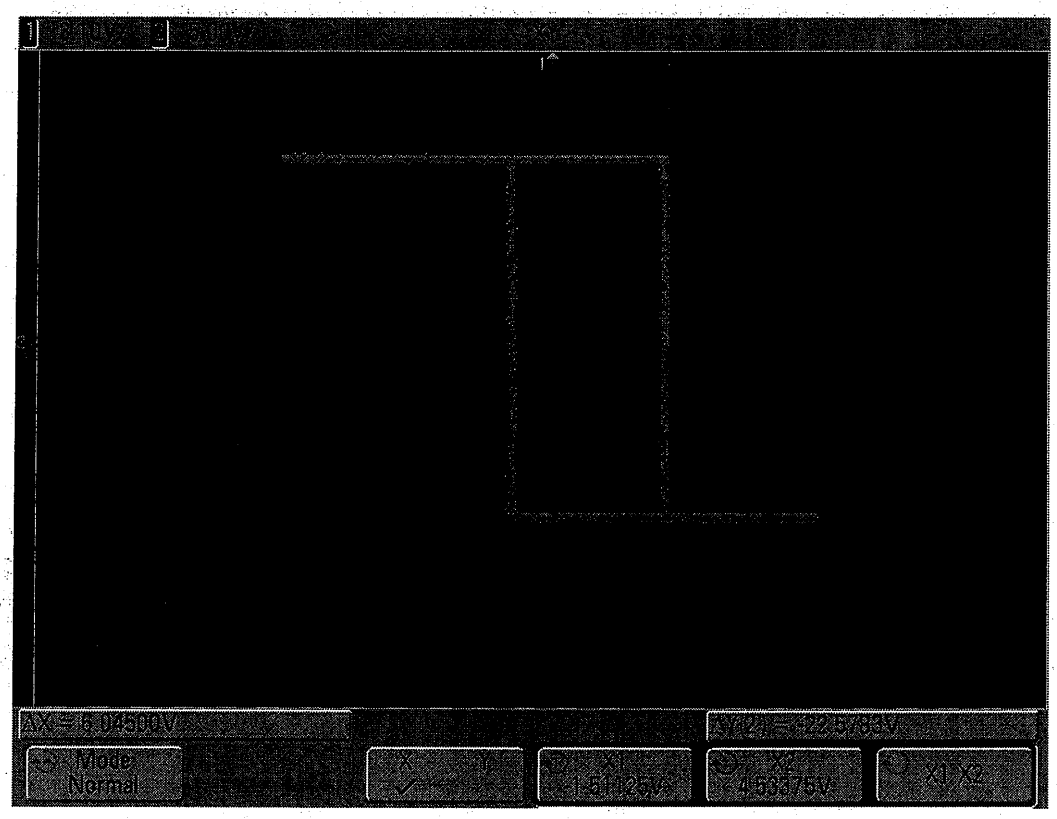

Figure 4: voltage hysteresis of operating Schmitt Trigger

The circui e what the expected hysteresis should look like (Figures 5 PICE were unable to simulate the circuit correctly, so using Mic urve in figure 6 was simulated.

Figure 5: Circuit used to simulate Hysteresis

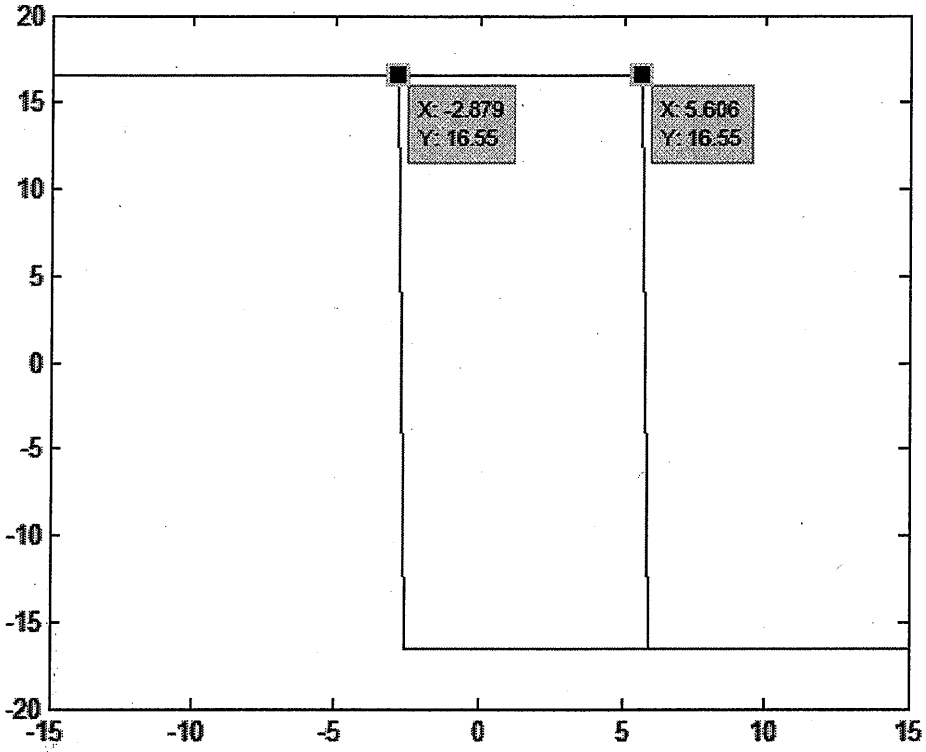

Figure 6: Simulated Hysteresis loop

Conclusion:

After doing this experiment, a Schmitt Trigger was correctly designed based on the given parameters. A zero crossing test was used to determine Vh and Vl, and these parameters were then used to design the circuit. When tested, this circuit worked as expected. The trickiest part of this experiment was the simulation. The software has some issues simulating the Hysteresis loop with the correct voltage parameters. The Schmitt trigger is a way to control the output voltage in a range by adjusting the input voltage. This project was a good example of a situation where the simulation does not at all reflect what happens to the actual circuit.

Calculations Page

$V^+ =$

V_{ref}

V_{ref}

V_i

V_i

.8kΩ

.035V

$V_{TH} = V_S$

$V_{TL} = V$