

Examination of Voltage Transfer Characteristics in 5Spice

Voltage Transfer Characteristics (VTCs) can also be observed in 5Spice too. Yet, it might not be as straight forward as it usually is in other circuit simulators. In order to demonstrate each step that you have to follow, in this document we would like to obtain a VTC for a predetermined TTL inverter, totally using 5Spice.

Step 1: Build your circuit and Set-up your input

Build your circuit, which is a standard TTL inverter in our case. When the input signal is selected a dialog box appears where you can edit Vin (input signal). Select “DC analysis” tab. Here, we have chosen to view the VTC of our inverter while Vin gets values between 0-2.5 Volts with an incrementation of 0.01.

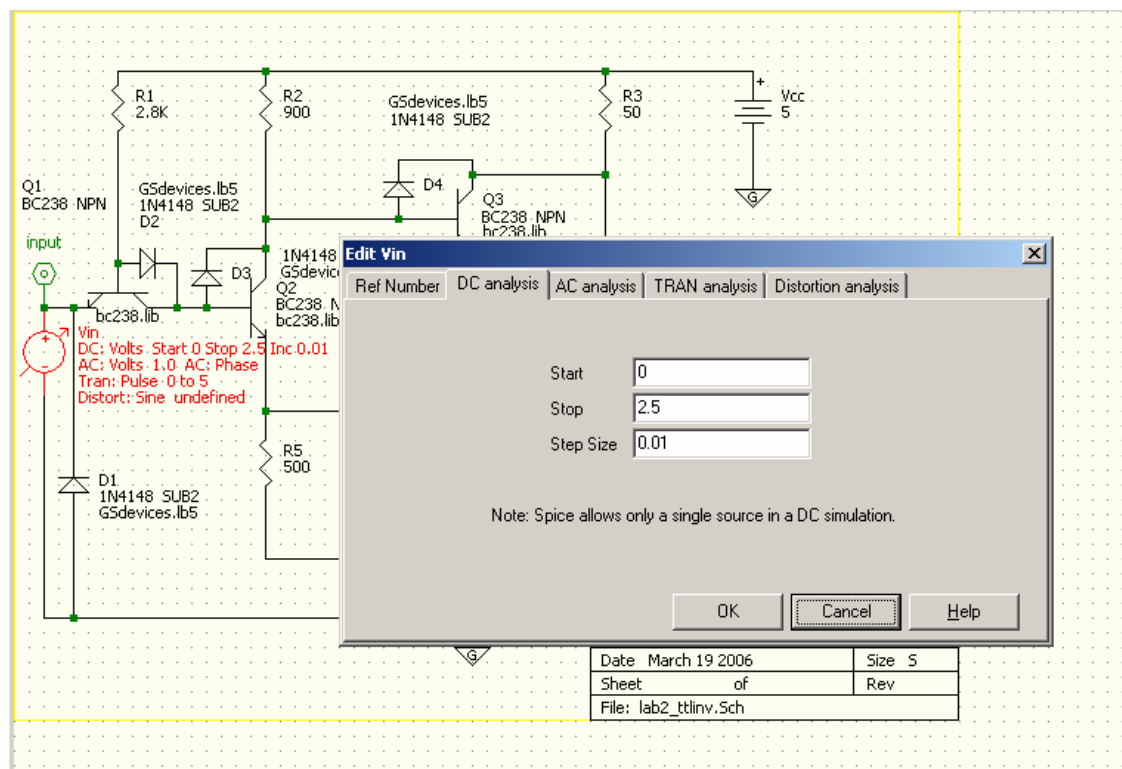


Figure 1

Step 2: Creating a New Analysis

After having set the input voltage, now select “Analyze/Edit” option under “Analyze” tab. Since our type of analysis is not present in 5Spice by default, we have to declare a new analysis. Click on the DC - option. Make sure that Vin, which is listed under the “Use Source(s)” is clicked.

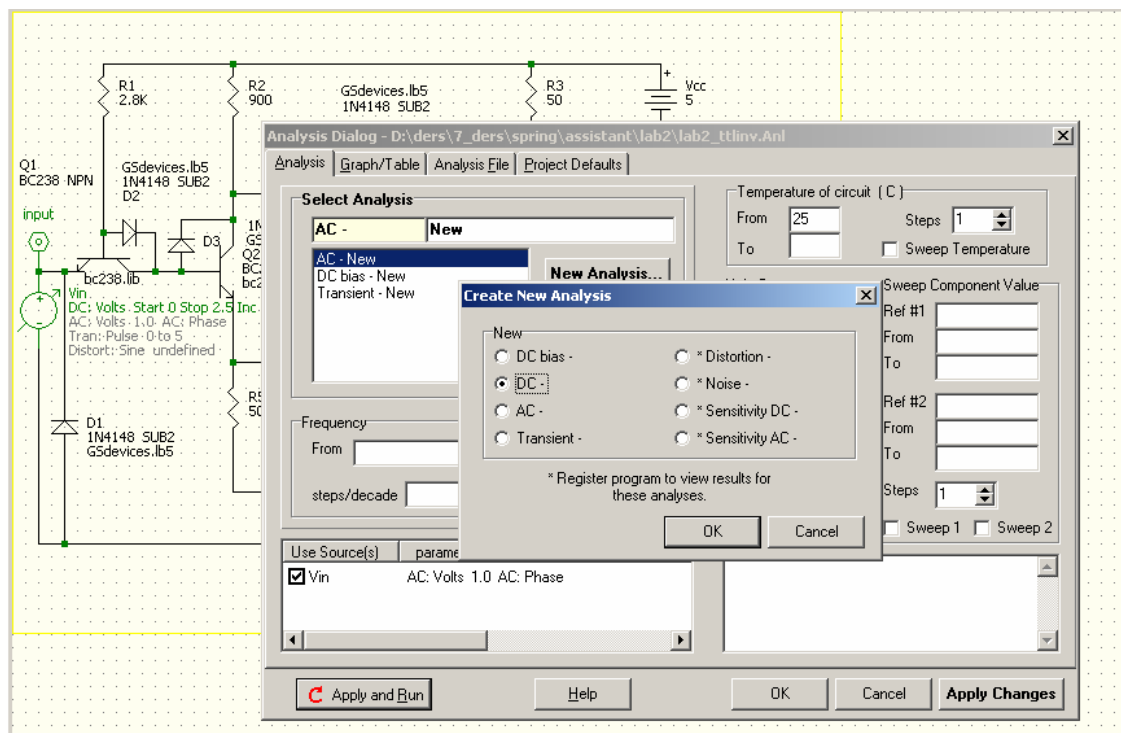


Figure 2

Step 3: Plotting

Now, you may add all the plots that you want to examine as you always do in the transient analysis from the “Graph/Table” tab. For this specific case, the investigation of VTC, output vs. input plot seems to be enough. In Figure 3, you can see VTC graph, obtained fully using 5Spice. 5Spice has a powerful simulation unit, we may now can compare our data that we used to obtain from Spice Opus.

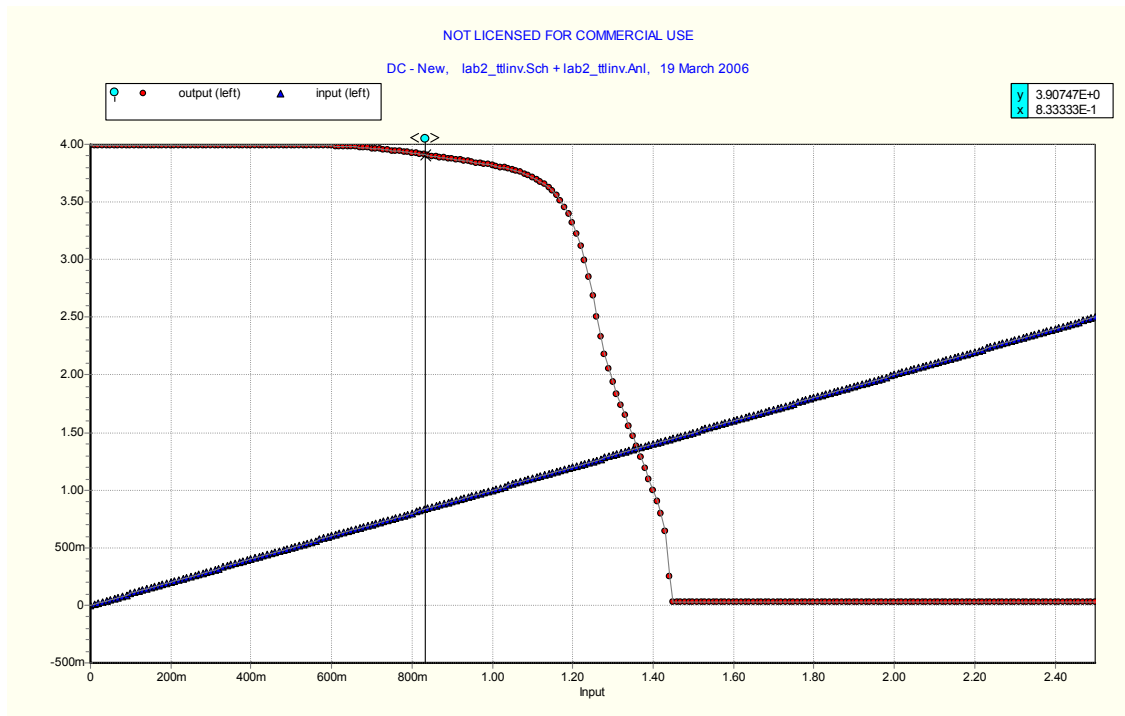


Figure 3

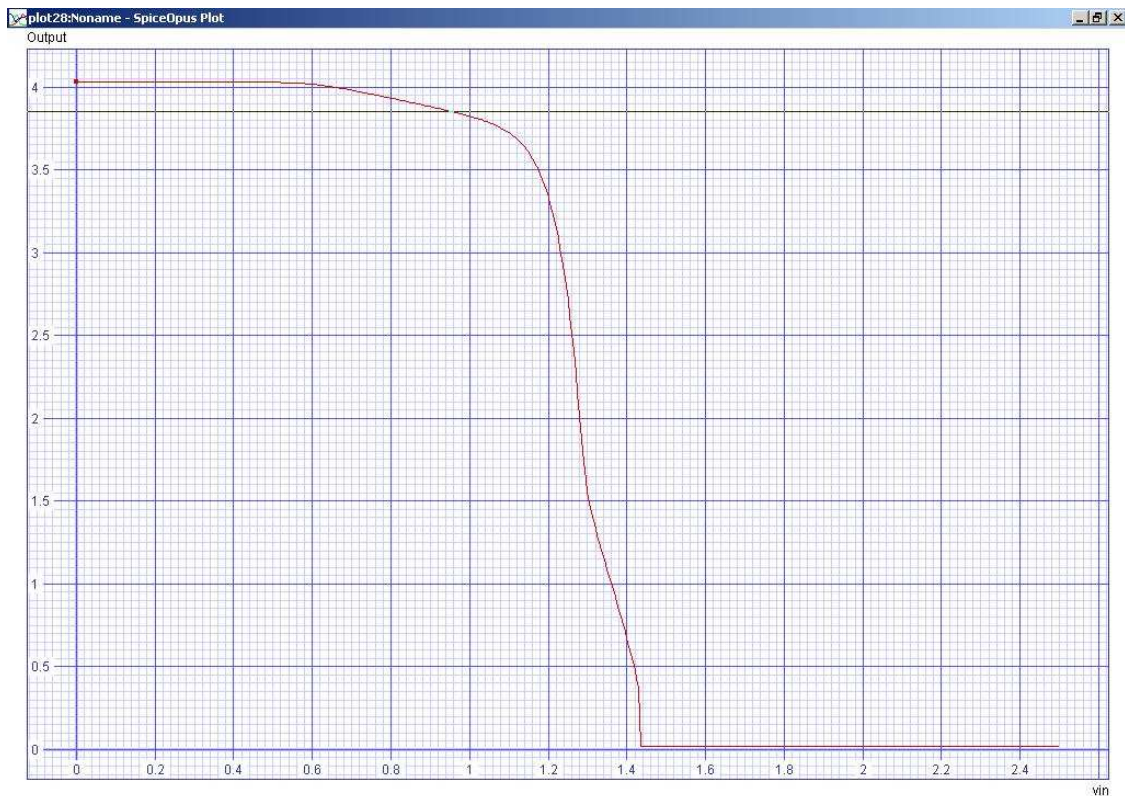


Figure 4

Additional Step: Sweeping a variable

If you had to sweep a variable during, let us say a VTC investigation. Then go back to the “Analysis Dialog”. Here you can enter the parameter that you would like to sweep in the following manner. For our circuit, we would like to see different VTC curves for different Vcc voltages. The critical point is that, you should pay attention when entering the full name of the parameter that is being swept. 5Spice is case sensitive, in the regarding box, we have entered “Vcc” as it exactly appears in the circuit at the back. Such a sweep would plot 6(Steps+1) VTC curves for Vcc voltages starting from 2.5Volts up to 7Volts. Make sure that “Sweep 1” is also selected. The resulting curves are portrayed in Figure 6.

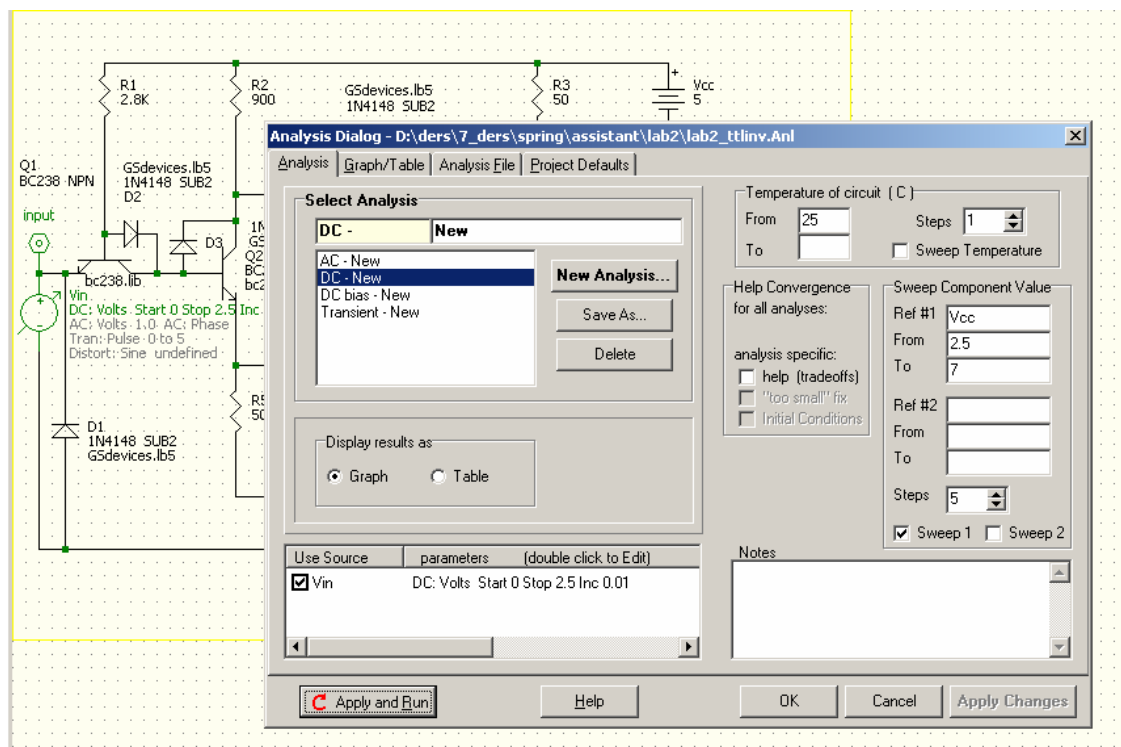


Figure 5

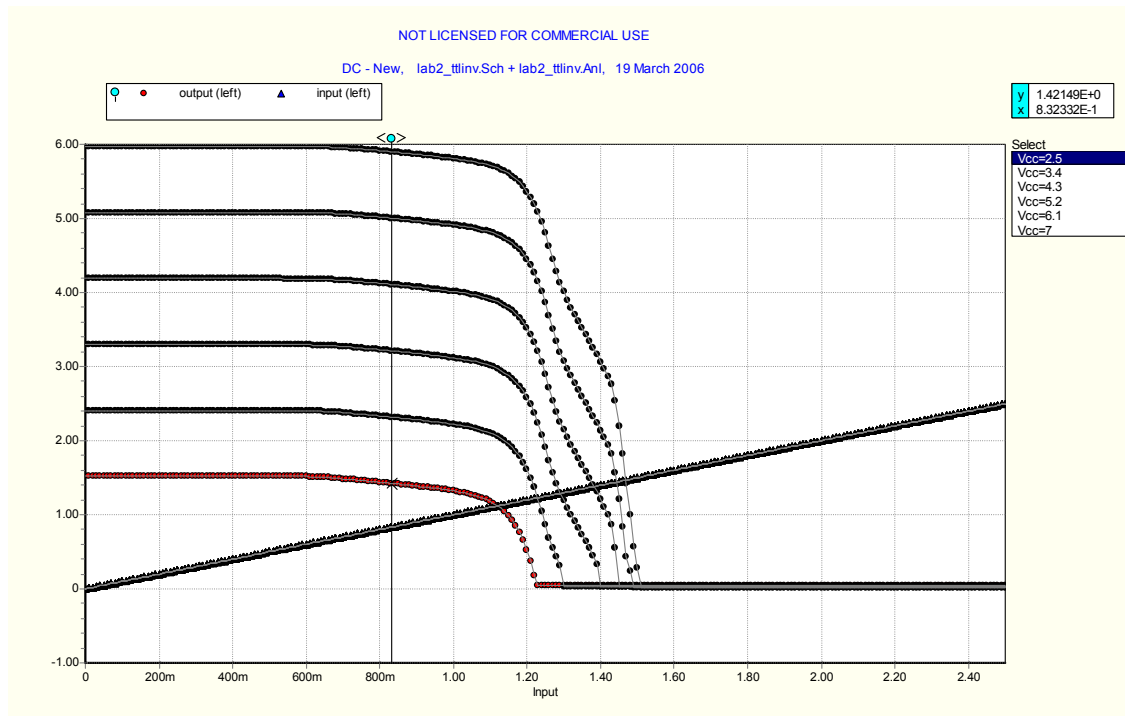


Figure 6