

`bjt_ic_vce.sqproj`

Description

Shown in Fig. 1 is a simulation set-up for plotting $I_C - V_{CE}$ characteristics of an *npn* BJT for different values of I_B . The results are shown in Fig. 1. Note the use of the `vary_parm` statement in the solve block.

Assignments

1. Change the value of the Early voltage (`vaf`) to 100 V, and observe its effect on the characteristics. Explain.
2. The parameters `ikf` and `ise` are related to reduction in the transistor gain (I_C/I_B) at high values of I_C . For `ikf` = 0.1, and `ise` = 10 f, plot the $I_C - V_{CE}$ characteristics, and compare with the original curves.
3. Plot $I_C - V_{CE}$ characteristics for `nf` = 1.3, and compare with the original curves.

In all of the above, explain the physical basis of your observations.

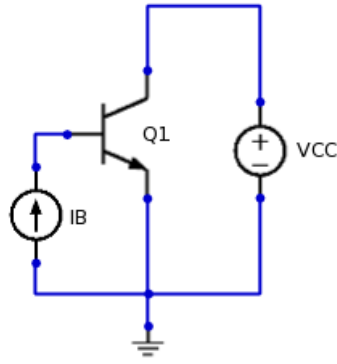


Figure 1: Simulation set-up for plotting I_C versus V_{CE} for a BJT.

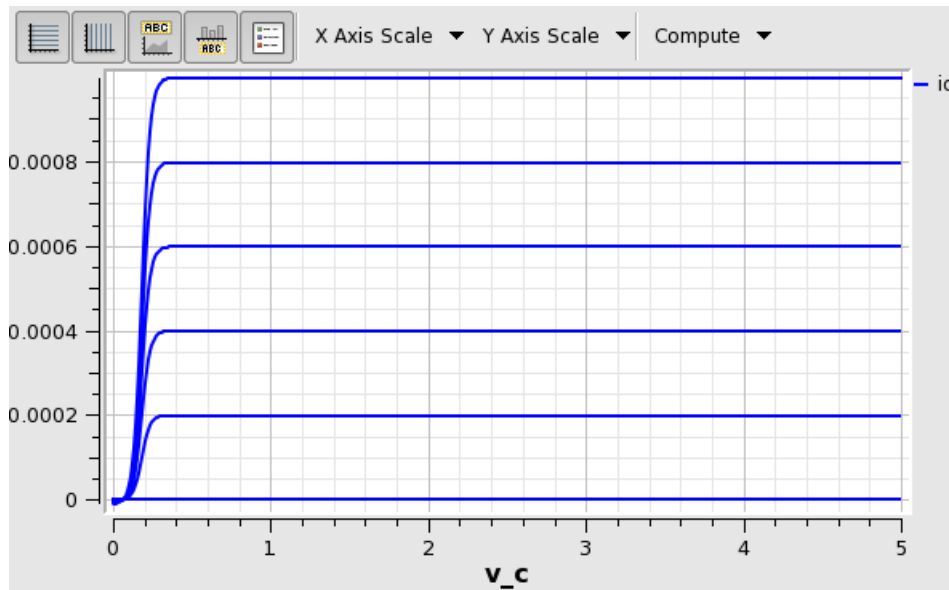


Figure 2: BJT $I - V$ characteristics obtained by simulating the circuit in Fig. 1.

References:

1. P. Antognetti and G. Massabrio, *Semiconductor device modeling with SPICE*, McGraw-Hill: New York, 1988.