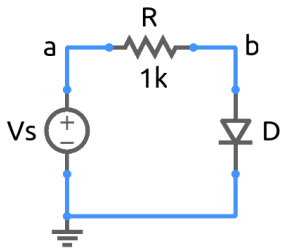
diode_iv.sqproj



The SPICE diode model is based on the Shockley diode equation [1]. The purpose of this exercise is to see how the I-V curve of a diode depends on the parameter I_s (saturation current) and the device temperature. To obtain the diode I-V curve, the input voltage in the circuit shown in the figure is varied, and the diode current is then plotted against the diode voltage.

Exercise Set

(a) Simulate the circuit and plot the I_D-V_D curve.

(b) Change I_s by a factor of 2, 5, 10, and see its effect on the I-V curve. Explain your observations.

(c) Simulate the circuit at T= 300 K, 320 K, 350 K. How does the I-V curve change? Explain the results on the basis of the Shockley equation.

References

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

2. B.G. Streetman and S.K. Banerjee, *Solid State Electronic Devices,* Pearson Education, 2006.

3. N. Dasgupta and A. Dasgupta, *Semiconductor Devices Modelling and Technology,* Prentice-Hall of India, 2004.