

Special Problem 3.3-21

A **Piece-wise Linear model** has been constructed (i.e., both V_{D0} and r_D have been determined) to model a certain junction diode.

This PWL model uses a DC voltage source $V_{D0} = 0.67 \text{ V}$.

The **model** provides a junction diode current estimate of $I_D = 50.0 \text{ mA}$ when the voltage is $V_D = 0.72 \text{ V}$.

Using this **same exact** PWL model, determine the **small-signal voltage** across the junction diode, if the **total** current through the diode happens to be:

$$i_D(t) = 50 + 1.0 \cos \omega t \text{ mA}$$

Hint: $r_D \neq \frac{nV_T}{I_D}$.