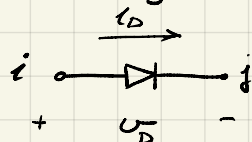


Diode model for assignment #2



$$V_D = v_i - v_j$$

$$I_D = I_s (e^{V_D/V_T} - 1)$$

Stamp:

$$\begin{array}{l} \text{row } i \text{ ---} \\ \text{row } j \text{ ---} \end{array} \left[\begin{array}{c} I_s (e^{(v_i - v_j)/V_T} - 1) \\ -I_s (e^{(v_i - v_j)/V_T} - 1) \end{array} \right]$$

$f(x)$

Contribution to jacobian $\frac{\partial f}{\partial x}$

$$\begin{array}{l} \text{row } i \text{ ---} \\ \text{row } j \text{ ---} \end{array} \left[\begin{array}{cc} \text{Col } i & \text{Col } j \\ \frac{I_s}{V_T} e^{(v_i - v_j)/V_T} & -\frac{I_s}{V_T} e^{(v_i - v_j)/V_T} \\ -\frac{I_s}{V_T} e^{(v_i - v_j)/V_T} & \frac{I_s}{V_T} e^{(v_i - v_j)/V_T} \end{array} \right]$$

Jacobian $\frac{\partial f}{\partial x}$

Red arrows indicate the partial derivatives of the current I_D with respect to the node voltages v_i and v_j :

- From the top-left element to $\frac{\partial I_D}{\partial v_i}$
- From the top-right element to $\frac{\partial I_D}{\partial v_j}$
- From the bottom-left element to $-\frac{\partial I_D}{\partial v_i}$
- From the bottom-right element to $-\frac{\partial I_D}{\partial v_j}$