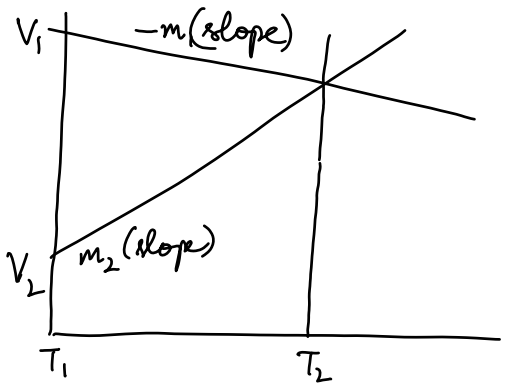
THERMAL SHUTDOWN SCHEMES

PRIMARY SCHEMES:

1. Compare NPTAT to fixed voltage
2. Compare NPTAT voltage to PTAT voltage
3. Compare Fixed voltage to PTAT voltage.

Case 1 & 3 are special cases of Case 2.

∴ Analysing Case 2:



$$\frac{V - V_1}{t - T_1} = -m_1 \quad \ldots \text{ NPTAT voltage}$$

$$\frac{V - V_2}{t - T_1} = m_2 \quad \ldots \text{ PTAT voltage}$$

@ T_2 both voltages are V

$$V_1 - (T_2 - T_1)m_1 = V_2 + m_2(T_2 - T_1)$$

$$\therefore T_2 = \frac{V_1 - V_2}{m_1 + m_2} + T_1$$

$$\text{Variation in } T_2 = \Delta T_2 = \frac{(m_1+m_2)(\Delta V_1 - \Delta V_2) - (V_1 - V_2)(\Delta m_1 + \Delta m_2)}{(m_1+m_2)^2}$$

$$\Delta T_2 = \frac{(\Delta V_1 + \Delta V_2)}{m_1+m_2} + \frac{\Delta m_1 + \Delta m_2}{m_1+m_2}\,\frac{V_1 - V_2}{m_1+m_2}$$

$m_2 = \Delta m_2 = 0 \longrightarrow$ Case 1

$m_1 = \Delta m_1 = 0 \longrightarrow$ Case 3