ANALISIS POR BLOQUES CON FUENTES INTERNAS

$$-\rho C_p \frac{dT}{dt} V + \dot{\varepsilon} \cdot V = hS(T-T_a)$$

$$\frac{dT}{dt} = -\frac{hS}{\rho C_p V}(T-T_a) + \frac{\dot{\varepsilon}}{\rho C_p} = \alpha(T-T_a)+\beta$$

$$T(0) = T_i$$

$$\frac{dT}{\alpha(T-T_a)+\beta} = dt \Rightarrow \frac{1}{\alpha} \ln\left[(T-T_a)\alpha+\beta\right]_{T_i}^{T} = t$$

$$\ln\left[\frac{(T-T_a)\alpha+\beta}{(T_i-T_a)\alpha+\beta}\right] = \alpha \cdot t \Rightarrow \frac{(T-T_a)\alpha+\beta}{(T_i-T_a)\alpha+\beta} = e^{-\frac{hS}{\rho V C_p}t}$$

$$\frac{T-T_a+\beta/\alpha}{T_i-T_a+\beta/\alpha} = e^{-\frac{hS}{\rho V C_p}t} \Rightarrow \beta/\alpha = \frac{\dot{\varepsilon}/\cancel{\rho C_p}}{-hS/\cancel{\rho C_p}V} = -\frac{\dot{\varepsilon}V}{hS}$$

$$\frac{T-T_a-\frac{\dot{\varepsilon}V}{hS}}{T_i-T_a-\frac{\dot{\varepsilon}V}{hS}} = e^{-\frac{hS}{\rho V C_p}t}$$

Si $t \to \infty \Rightarrow T-T_a-\frac{\dot{\varepsilon}V}{hS} = 0 \Rightarrow \boxed{T = T_a + \frac{\dot{\varepsilon}V}{hS}}$