

Gene g_i produce p_i . The material balance equations govern the concentration of mRNA (m_i)

The equation is:

$$\text{mRNA:} \quad \dot{m}_i = r_x u_i - (\mu + \theta_{m,i}) m_i + \lambda_i$$

$$\text{protein:} \quad \dot{p}_i = r_L w_i - (\mu + \theta_{p,i}) p_i$$

In a cell-free system, dilution is small.

$$\text{then} \quad \dot{m}_i = r_x u_i - \theta_{m,i} m_i + \lambda_i$$

$$\dot{p}_i = r_L w_i - \theta_{p,i} p_i$$