

$$\frac{dAiiA}{dt} = C_{AiiA} \cdot [1 - (\frac{d}{d_0})^4] \cdot \frac{\delta_{hybr_tetR} + \alpha \cdot AHLi_\tau^2}{1 + k_1 \cdot AHLi_\tau^2} \cdot \frac{1}{1 + \frac{\beta_{tetR} \cdot tetR^{n_tetR}}{1 + \beta_{aTc} \cdot aTc^{n_aTc}}} - \gamma_{AiiA} \cdot \frac{AiiA}{1 + f(AiiA + LuxI + GFP)} \quad (1)$$

$$\frac{dLuxI}{dt} = C_{LuxI} \cdot [1 - (\frac{d}{d_0})^4] \cdot \frac{\delta_{hybr_LacI} + \alpha \cdot AHLi_\tau^2}{1 + k_1 \cdot AHLi_\tau^2} \cdot \frac{1}{1 + \frac{\beta_{LacI} \cdot LacI^{n_LacI}}{1 + \beta_{IPTG} \cdot IPTG^{n_IPTG}}} - \gamma_{LuxI} \cdot \frac{LuxI}{1 + f(AiiA + LuxI + GFP)} \quad (2)$$

$$\frac{dAHLi}{dt} = \frac{b \cdot LuxI}{1 + k \cdot LuxI} - \gamma_{AHL} \cdot \frac{AiiA \cdot AHLi}{1 + g \cdot AiiA} + D \cdot (AHL_e - AHLi) \quad (3)$$

$$\frac{dAHL_e}{dt} = -\frac{d}{1 - d} \cdot D \cdot (AHL_e - AHLi) \quad (4)$$

$$\frac{dGFP}{dt} = C_{GFP} \cdot [1 - (\frac{d}{d_0})^4] \cdot \frac{\delta + \alpha \cdot AHLi_\tau^2}{1 + k_1 \cdot AHLi_\tau^2} - \gamma_{GFP} \cdot \frac{GFP}{1 + f(AiiA + LuxI + GFP)} \quad (5)$$