

## Mathematical model without residual affinity between induced lactose repressor molecules and operator sites

$$\frac{dM_{G/L}}{dt} = \alpha_{G/L}^M D_{G/L}^F - \lambda_{G/L}^M M_{G/L} \quad (S1),$$

$$D_{G/L}^F = D_{G/L}^0 - D_{G/L}^L \quad (S2),$$

$$\frac{dD_{G/L}^L}{dt} = \frac{1}{\tau^{DL}} \left[ \frac{D_{G/L}^F L^F}{K_{x/y}^L} - D_{G/L}^L \right] \quad (S3),$$

$$\frac{dL^I}{dt} = \frac{1}{\tau^{LI}} \left[ L^F \left( \frac{I}{K^{LI}} \right)^n - L^I \right] - \lambda_L L^I \quad (S4),$$

$$\frac{dL^F}{dt} = \alpha_L M_L - \lambda_L L^F - \frac{1}{\tau^{LI}} \left[ L^F \left( \frac{I}{K^{LI}} \right)^n - L^I \right] - \frac{dD_G^L}{dt} - \frac{dD_L^L}{dt} \quad (S5),$$

$$\frac{dG}{dt} = \alpha_G M_G - \lambda_G G \quad (S6).$$