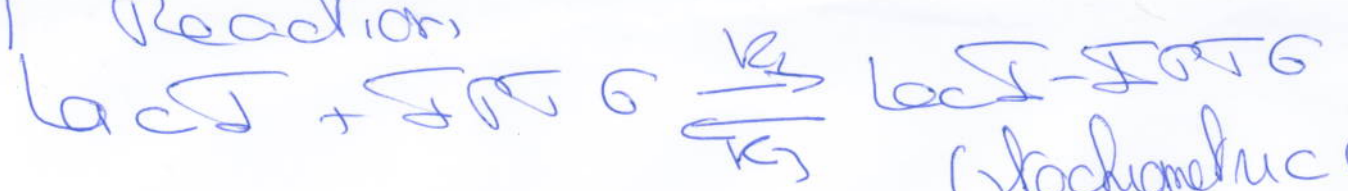
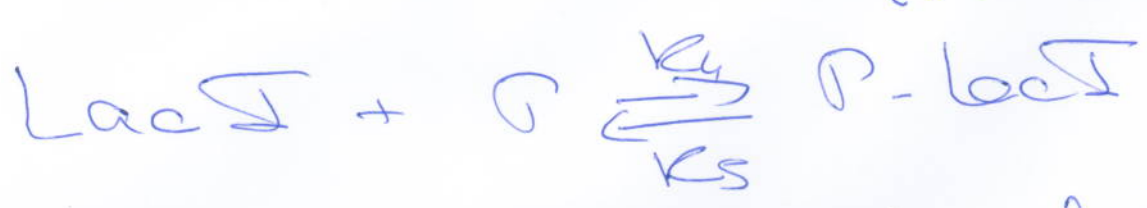


Model 2: Much simpler

ST Reaction



(stochiometric coeff may be made to vary)



No feedback loop

II Before the introduction of STG

Only repression is possible

$$[\text{LacI}] = k_1 / d_1$$

$$P = \frac{P_0}{1 + K_P [\text{LacI}]}$$

$$[\text{STG}]_{ss} = \frac{K_G}{d_{STG}} \times P_{ss}$$

$$P = P_T - \frac{\text{Bound Promoter}}{K_P [\text{LacI}]}$$

where $p = \text{free promoter} =$
 $P_0 = ?$
 $K_P = ?$

less P production.

III Now we introduce STG

Initial state = previous steady state

$$\frac{d[\text{STG}]}{dt} = K_G [P] - d_G [\text{STG}]$$

$$\frac{d[\text{LacI}]}{dt} = k_1 - d_1 [\text{LacI}] + k_5 [P\text{-LacI}] - k_4 [\text{LacI}] P + k_3 [\text{STG-LacI}] - k_2 [\text{LacI}] [\text{STG}]$$

$$\frac{d[\text{STG-LacI}]}{dt} = k_2 [\text{LacI}] [\text{STG}] - k_3 [\text{STG-LacI}]$$

$$\frac{dP}{dt} = K_S [P\text{-LacI}] - k_6 P [\text{LacI}]$$

At steady state $[\text{LacI}] = k_1 / d_1$

$$[P\text{-LacI}] = K_P P [\text{LacI}]$$

$$[\text{LacI-STG}] = K_A [\text{LacI}] [\text{STG}]$$

Conservation Equations

$$I_0 = [I_{00} \bar{v}] + [k_{00} \bar{v} - I_{00} \bar{v}]$$

$$P_0 = P + [P - k_{00} \bar{v}]$$

$$\Rightarrow P_s = \frac{P_0}{1 + K_p [k_{00} \bar{v}]}, \quad \text{again}$$

$$[I_{00} \bar{v}] = \frac{I_0}{1 + K_p [k_{00} \bar{v}]}$$

* First Remark : P_s independent of I_0 !!
 $\Rightarrow [I_{00} \bar{v}]$ independent of I_0

* Second Remark

