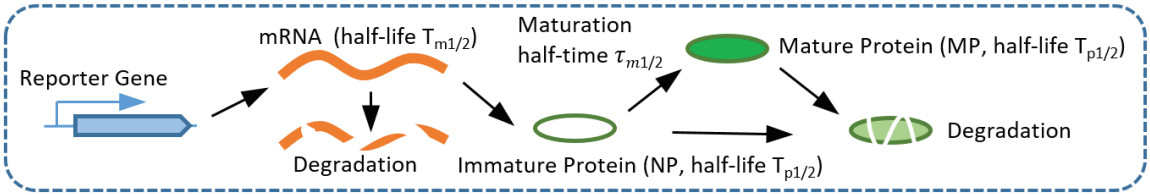
Figure 1-figure Supplement 1

a.



b.

$$\begin{cases} \frac{d[R]}{dt} = k_1 F(t) - \frac{[R]V'_{max}}{[R]+K'_m} & (1) \\ \frac{d[NP]}{dt} = k_2[R] - \frac{ln2\cdot[NP]}{\tau_{m1/2}} - \frac{[NP]V''_{max}}{[NP]+[MP]+K''_m} & (2) \\ \frac{d[MP]}{dt} = \frac{ln2\cdot[NP]}{\tau_{m1/2}} - \frac{[MP]V''_{max}}{[NP]+[MP]+K''_m} & (3) \end{cases} \xrightarrow[[P]+[NP] \ll K''_m]{[R] \ll K'_m} \begin{cases} \frac{d[R]}{dt} = k_1 F(t) - \frac{ln2\cdot[R]}{T_{m1/2}} & (1') \\ \frac{d[NP]}{dt} = k_2[R] - \frac{ln2\cdot[NP]}{\tau_{m1/2}} - \frac{ln2\cdot[NP]}{T_{p1/2}} & (2') \\ \frac{d[MP]}{dt} = \frac{ln2\cdot[NP]}{\tau_{m1/2}} - \frac{ln2\cdot[MP]}{T_{p1/2}} & (3') \end{cases}$$

$$F(t) = \frac{1}{k_1\cdot k_2}\{\frac{\tau_{1/2}}{ln2}[MP]''' + (\frac{2\tau_{1/2}}{T_{p1/2}} + \frac{\tau_{1/2}}{T_{m1/2}} + 1)[MP]'' + (\frac{ln2\cdot\tau_{1/2}}{T_{p1/2}^2} + \frac{ln2\cdot(T_{p1/2}+2\tau_{1/2})}{T_{m1/2}\cdot T_{p1/2}} + \frac{ln2\cdot T_{m1/2}}{T_{p1/2}\cdot\tau_{1/2}})[MP]' + (\frac{ln2\cdot ln2\cdot(T_{p2/1}+\tau_{1/2})}{T_{m1/2}\cdot T_{p1/2}})[MP]\} \quad (4)$$

For *sfGFP*, $\tau_{1/2} \ll 1$

$$F(t) = \frac{1}{k_1\cdot k_2}\{[MP]'' + (\frac{ln2\cdot T_{m1/2}}{T_{p1/2}\cdot\tau_{1/2}})[MP]' + (\frac{ln2\cdot ln2}{T_{m1/2}})[MP]\} \quad (4')$$

c.

Parameter	Description	Dimension	Default Value
R	mRNA concentration	nMh^{-1}	0
NP	Immature protein concentration	nMh^{-1}	0
MP	Mature protein concentration	nMh^{-1}	0
$T_{m1/2}$	mRNA half-life	h	0.5
$T_{p1/2}$	Protein half-life	h	1~20
$\tau_{m1/2}$	Maturation half-time	h	0.2~2
k1	Transcriptional efficiency	h^{-1}	1
k2	Translational efficiency	h^{-1}	1
F(t)	Promoter activity	nM	-
K_m'	Michaelis-Menten constant of mRNA degradation	nM	-
K_m''	Michaelis-Menten constant of protein degradation	nM	-
V_{max}'	Maximal rate of the mRNA degradation	nMh^{-1}	-
V_{max}''	Maximal rate of the protein degradation	nMh^{-1}	-