1 Symbols

Variable	Meaning
V_1	Construct vector, species 1
V_2	Construct vector, species 1
G_1	gRNA, species 1
G_2	gRNA, species 2
G_3	gRNA, species 3
G_4	gRNA, species 4
G_5	gRNA, species 5
G_6	gRNA, species 6
P_{dCas9}	dCas9 protein species
P_{GFP}	GFP protein species
$C_{\mathrm{dCas9,1}}$	Complex of dCas9 protein and gRNA1
$C_{\mathrm{dCas9,2}}$	Complex of dCas9 protein and gRNA2
$C_{\mathrm{dCas9,3}}$	Complex of dCas9 protein and gRNA3
$C_{\mathrm{dCas9,4}}$	Complex of dCas9 protein and gRNA4
$C_{\mathrm{dCas9,5}}$	Complex of dCas9 protein and gRNA5
$C_{\mathrm{dCas9,6}}$	Complex of dCas9 protein and gRNA6
$\alpha_{r,i}$	Transcription rate, species i
$\alpha_{p,i}$	Coupled transcription and translationrate, species i
δ_g	gRNA degradation rate
$\delta_{p,}$	Protein degradation rate
λ	Stable Molecule Dilution Rate
$\delta_{p,P_{\mathrm{dCas9}}}$	dCas9 and dCas9-gRNA complex degradation rate
δ_{C_g}	dCas9-gRNA1 complex degradation rate
δ_{C_g}	dCas9-gRNA2 complex degradation rate
δ_{C_g}	dCas9-gRNA3 complex degradation rate
δ_{C_g}	dCas9-gRNA4 complex degradation rate
δ_{C_g}	dCas9-gRNA5 complex degradation rate
δ_{C_g}	dCas9-gRNA6 complex degradation rate
$\delta_{p,P_{\mathrm{GFP}}}$	GFP protein degradation rate
k_{C_g}	dCas9 and gRNA binding rate
n	Hill coefficient
K_A	Hill Activation Constant
K_R	Hill Repression Constant
$I_{i,j}$	Interference Matrix entry at coordinates i, j

2 Equations

2.1 0 Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{1}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda[P_{\mathrm{dCas9}}] \tag{2}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} V_2 - \lambda[P_{\mathrm{GFP}}] \tag{3}$$

2.2 1 Target Site

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{4}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g[G_1] \tag{5}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},1}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9},1}] \tag{6}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda[P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] \tag{7}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} V_2 - \lambda[P_{\mathrm{GFP}}] \tag{8}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{9}$$

2.3 2 Heterogeneous Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{10}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g[G_1] \tag{11}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},1}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9},1}] \tag{12}$$

$$\frac{\mathrm{d}[G_2]}{\mathrm{d}t} = \alpha_{r,G_2} V_1 - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \delta_g[G_2] \tag{13}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},2}]}{\mathrm{d}t} = k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9},2}] \tag{14}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda[P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - k_{C_g}[G_2][P_{\mathrm{dCas9}}] \tag{15}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},2}]^n} V_2 - \lambda[P_{\mathrm{GFP}}] \tag{16}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{17}$$

2.4 2 Identical Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{18}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g [G_1] \tag{19}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},1}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9},1}] \tag{20}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda [P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] \tag{21}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} V_2 - \lambda [P_{\mathrm{GFP}}] \tag{22}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{23}$$

2.5 3 Heterogeneous Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{24}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g [G_1] \tag{25}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},1}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9},1}] \tag{26}$$

$$\frac{\mathrm{d}[G_2]}{\mathrm{d}t} = \alpha_{r,G_2} V_1 - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \delta_g [G_2] \tag{27}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},2}]}{\mathrm{d}t} = k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9},2}] \tag{28}$$

$$\frac{\mathrm{d}[G_3]}{\mathrm{d}t} = \alpha_{r,G_3} V_1 - k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \delta_g [G_3] \tag{29}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},3}]}{\mathrm{d}t} = k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9},3}] \tag{30}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda [P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - k_{C_g}[G_3][P_{\mathrm{dCas9}}] \tag{31}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},2}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},3}]^n} V_2 - \lambda [P_{\mathrm{GFP}}] \tag{32}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{33}$$

2.6 3 Identical Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{34}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g [G_1] \tag{35}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},1}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9},1}] \tag{36}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda [P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] \tag{37}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} V_2 - \lambda [P_{\mathrm{GFP}}] \tag{38}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{39}$$

2.7 4 Heterogeneous Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{40}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g [G_1] \tag{41}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,1}}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9,1}}] \tag{42}$$

$$\frac{\mathrm{d}[G_2]}{\mathrm{d}t} = \alpha_{r,G_2} V_1 - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \delta_g [G_2] \tag{43}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,2}}]}{\mathrm{d}t} = k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9,2}}] \tag{44}$$

$$\frac{\mathrm{d}[G_3]}{\mathrm{d}t} = \alpha_{r,G_3} V_1 - k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \delta_g [G_3] \tag{45}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,3}}]}{\mathrm{d}t} = k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9,3}}] \tag{46}$$

$$\frac{\mathrm{d}[G_4]}{\mathrm{d}t} = \alpha_{r,G_4} V_1 - k_{C_g}[G_4][P_{\mathrm{dCas9}}] - \delta_g [G_4] \tag{47}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,4}}]}{\mathrm{d}t} = k_{C_g}[G_4][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9,4}}] \tag{48}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda [P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - k_{C_g}[G_3][P_{\mathrm{dCas9}}] - k_{C_g}[G_4][P_{\mathrm{dCas9}}] \tag{49}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,2}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,3}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,4}}]^n} V_2 - \lambda [P_{\mathrm{GFP}}] \tag{50}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{51}$$

2.8 4 Identical Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{52}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g [G_1] \tag{53}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,1}}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9,1}}] \tag{54}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda [P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] \tag{55}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} V_2 - \lambda[P_{\mathrm{GFP}}] \tag{56}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{57}$$

2.9 5 Heterogeneous Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{58}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g[G_1] \tag{59}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,1}}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,1}}] \tag{60}$$

$$\frac{\mathrm{d}[G_2]}{\mathrm{d}t} = \alpha_{r,G_2} V_1 - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \delta_g[G_2] \tag{61}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,2}}]}{\mathrm{d}t} = k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,2}}] \tag{62}$$

$$\frac{\mathrm{d}[G_3]}{\mathrm{d}t} = \alpha_{r,G_3} V_1 - k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \delta_g[G_3] \tag{63}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,3}}]}{\mathrm{d}t} = k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,3}}] \tag{64}$$

$$\frac{\mathrm{d}[G_4]}{\mathrm{d}t} = \alpha_{r,G_4} V_1 - k_{C_g}[G_4][P_{\mathrm{dCas9}}] - \delta_g[G_4] \tag{65}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,4}}]}{\mathrm{d}t} = k_{C_g}[G_4][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,4}}] \tag{66}$$

$$\frac{\mathrm{d}[G_5]}{\mathrm{d}t} = \alpha_{r,G_5} V_1 - k_{C_g}[G_5][P_{\mathrm{dCas9}}] - \delta_g[G_5] \tag{67}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,5}}]}{\mathrm{d}t} = k_{C_g}[G_5][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,5}}] \tag{68}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda[P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - k_{C_g}[G_3][P_{\mathrm{dCas9}}] - k_{C_g}[G_4][P_{\mathrm{dCas9}}] - k_{C_g}[G_5][P_{\mathrm{dCas9}}] \tag{69}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,2}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,3}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,4}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,5}}]^n} V_2 - \lambda[P_{\mathrm{GFP}}] \tag{70}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{71}$$

2.10 5 Identical Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{72}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g[G_1] \tag{73}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,1}}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,1}}] \tag{74}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda[P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] \tag{75}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} V_2 - \lambda[P_{\mathrm{GFP}}] \tag{76}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{77}$$

2.11 6 Heterogeneous Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{78}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g[G_1] \tag{79}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,1}}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,1}}] \tag{80}$$

$$\frac{\mathrm{d}[G_2]}{\mathrm{d}t} = \alpha_{r,G_2} V_1 - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \delta_g[G_2] \tag{81}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,2}}]}{\mathrm{d}t} = k_{C_g}[G_2][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,2}}] \tag{82}$$

$$\frac{\mathrm{d}[G_3]}{\mathrm{d}t} = \alpha_{r,G_3} V_1 - k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \delta_g[G_3] \tag{83}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,3}}]}{\mathrm{d}t} = k_{C_g}[G_3][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,3}}] \tag{84}$$

$$\frac{\mathrm{d}[G_4]}{\mathrm{d}t} = \alpha_{r,G_4} V_1 - k_{C_g}[G_4][P_{\mathrm{dCas9}}] - \delta_g[G_4] \tag{85}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,4}}]}{\mathrm{d}t} = k_{C_g}[G_4][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,4}}] \tag{86}$$

$$\frac{\mathrm{d}[G_5]}{\mathrm{d}t} = \alpha_{r,G_5} V_1 - k_{C_g}[G_5][P_{\mathrm{dCas9}}] - \delta_g[G_5] \tag{87}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,5}}]}{\mathrm{d}t} = k_{C_g}[G_5][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,5}}] \tag{88}$$

$$\frac{\mathrm{d}[G_6]}{\mathrm{d}t} = \alpha_{r,G_6} V_1 - k_{C_g}[G_6][P_{\mathrm{dCas9}}] - \delta_g[G_6] \tag{89}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9,6}}]}{\mathrm{d}t} = k_{C_g}[G_6][P_{\mathrm{dCas9}}] - \lambda[C_{\mathrm{dCas9,6}}] \tag{90}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda[P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - k_{C_g}[G_2][P_{\mathrm{dCas9}}] - k_{C_g}[G_3][P_{\mathrm{dCas9}}] - k_{C_g}[G_4][P_{\mathrm{dCas9}}] - k_{C_g}[G_5][P_{\mathrm{dCas9}}] - k_{C_g}[G_6][P_{\mathrm{dCas9}}] \tag{91}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,1}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,2}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,3}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,4}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,5}}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9,6}}]^n} V_2 - \lambda[P_{\mathrm{GFP}}] \tag{92}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{93}$$

2.12 6 Identical Target Sites

$$\frac{\mathrm{d}V_2}{\mathrm{d}t} = -\lambda V_2 \tag{94}$$

$$\frac{\mathrm{d}[G_1]}{\mathrm{d}t} = \alpha_{r,G_1} V_1 - k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \delta_g [G_1] \tag{95}$$

$$\frac{\mathrm{d}[C_{\mathrm{dCas9},1}]}{\mathrm{d}t} = k_{C_g}[G_1][P_{\mathrm{dCas9}}] - \lambda [C_{\mathrm{dCas9},1}] \tag{96}$$

$$\frac{\mathrm{d}[P_{\mathrm{dCas9}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{dCas9}}} V_2 - \lambda [P_{\mathrm{dCas9}}] - k_{C_g}[G_1][P_{\mathrm{dCas9}}] \tag{97}$$

$$\frac{\mathrm{d}[P_{\mathrm{GFP}}]}{\mathrm{d}t} = \alpha_{p,P_{\mathrm{GFP}}} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} \frac{(K_R)^n}{(K_R)^n + [C_{\mathrm{dCas9},1}]^n} V_2 - \lambda [P_{\mathrm{GFP}}] \tag{98}$$

$$\frac{\mathrm{d}V_1}{\mathrm{d}t} = -\lambda V_1 \tag{99}$$