specific to pTet-circuit

$$pTet \xrightarrow{\beta_1} FlhDC + pTet \tag{1}$$

---

specific to pFlhDC-circuit

$$pFlhDC \xrightarrow{b_2} FlhDC + pFlhDC \tag{2}$$

$$n_3 FlhDC + pFliA \underset{k_{-3}}{\overset{k_3}{\rightleftharpoons}} (FlhDC)_{n_3} \bowtie pFliA \qquad K_3 = \frac{k_{-3}}{k_3} \tag{3}$$

$$n_4 FlhDC + pFlhB \underset{k_{-4}}{\overset{k_4}{\rightleftharpoons}} (FlhDC)_{n_4} \bowtie pFlhB \qquad K_4 = \frac{k_{-4}}{k_4} \tag{4}$$

$$(FlhDC)_{n_3} \bowtie pFliA \xrightarrow{b_5} FliA + (FlhDC)_{n_3} \bowtie pFliA \tag{5}$$

$$(FlhDC)_{n_4} \bowtie pFlhB \xrightarrow{b_6} FP3 + (FlhDC)_{n_4} \bowtie pFlhDC \tag{6}$$

---

specific to pTet-circuit

$$(FlhDC)_{n_4} \bowtie pFlhB \xrightarrow{b_6} TetR + (FlhDC)_{n_4} \bowtie pFlhB \tag{7}$$

---

specific to pFlhDC-circuit

$$(FlhDC)_{n_4} \bowtie pFlhB \xrightarrow{b_6} OmpR^* + (FlhDC)_{n_4} \bowtie pFlhB \tag{8}$$

$$n_9 FliA + pFliA \underset{k_{-9}}{\overset{k_9}{\rightleftharpoons}} (FliA)_{n_9} \bowtie pFliA \qquad K_9 = \frac{k_{-9}}{k_9} \tag{9}$$

$$n_{10} FliA + pFlhB \underset{k_{-10}}{\overset{k_{10}}{\rightleftharpoons}} (FliA)_{n_{10}} \bowtie pFlhB \qquad K_{10} = \frac{k_{-10}}{k_{10}} \tag{10}$$

---

specific to pFlhDC-circuit

$$n_{11} FliA + pFlhDC \underset{k_{-11}}{\overset{k_{11}}{\rightleftharpoons}} (FliA)_{n_{11}} \bowtie pFlhDC \qquad K_{11} = \frac{k_{-11}}{k_{11}} \tag{11}$$

---

specific to pFlhDC-circuit

$$(FliA)_{n_{11}} \bowtie pFlhDC \xrightarrow{b_{12}} FlhDC + (FliA)_{n_{11}} \bowtie pFlhDC \tag{12}$$

$$(FliA)_{n_9} \bowtie pFliA \xrightarrow{b_{13}} FliA + (FliA)_{n_9} \bowtie pFliA \tag{13}$$

$$(FliA)_{n_{10}} \bowtie pFlhB \xrightarrow{b_{14}} FP3 + (FliA)_{n_{10}} \bowtie pFlhB \tag{14}$$

---

specific to pTet-circuit

$$(FliA)_{n_{10}} \bowtie pFlhB \xrightarrow{b_{14}} TetR + (FliA)_{n_{10}} \bowtie pFlhB \tag{15}$$

---

specific to pFlhDC-circuit

$$(FliA)_{n_{10}} \bowtie pFlhB \xrightarrow{b_{14}} OmpR^* + (FliA)_{n_{10}} \bowtie pFlhB \tag{16}$$

---

specific to pTet-circuit

$$aTc + TetR \underset{k_{-17}}{\overset{k_{17}}{\rightleftharpoons}} aTc{\bowtie}TetR \qquad K_{17} = \frac{k_{-17}}{k_{17}} \tag{17}$$

---

specific to pTet-circuit

$$n_{18}TetR + pTet \underset{k_{-18}}{\overset{k_{18}}{\rightleftharpoons}} (TetR)_{n_{18}}{\bowtie}pTet \qquad K_{18} = \frac{k_{-18}}{k_{18}} \tag{18}$$

---

specific to pFlhDC-circuit

$$n_{19}OmpR^* + pFlhDC \underset{k_{-19}}{\overset{k_{19}}{\rightleftharpoons}} (OmpR^*)_{n_{19}}{\bowtie}pFlhDC \qquad K_{19} = \frac{k_{-19}}{k_{19}} \tag{19}$$

$$FlhDC \xrightarrow{\gamma_{20}} \emptyset \tag{20}$$

$$FliA \xrightarrow{\gamma_{21}} \emptyset \tag{21}$$

$$FP3 \xrightarrow{\gamma_{22}} \emptyset \tag{22}$$

---

specific to pTet-circuit

$$TetR \xrightarrow{\gamma_{23}} \emptyset \tag{23}$$

---

specific to pFlhDC-circuit

$$OmpR^* \xrightarrow{\gamma_{24}} \emptyset \tag{24}$$

$$(3) \Rightarrow \quad \frac{d[(FlhDC)_{n_3} \bowtie pFliA]}{d\,t} = \begin{aligned} & k_3[FlhDC]^{n_3}[pFliA] \\ & - k_{-3}[(FlhDC)_{n_3} \bowtie pFliA] \end{aligned} \tag{25}$$

$$\Rightarrow \quad [(FlhDC)_{n_3} \bowtie pFliA]_{eq} = \frac{[FlhDC]^{n_3}}{K_3 + [FlhDC]^{n_3}} \cdot [pFliA^{total}] \tag{26}$$

$$(4) \Rightarrow \quad \frac{d[(FlhDC)_{n_4} \bowtie pFlhB]}{d\,t} = \begin{aligned} & k_4[FlhDC]^{n_4}[pFlhB] \\ & - k_{-4}[(FlhDC)_{n_4} \bowtie pFlhB] \end{aligned} \tag{27}$$

$$\Rightarrow \quad [(FlhDC)_{n_4} \bowtie pFlhB]_{eq} = \frac{[FlhDC]^{n_4}}{K_4 + [FlhDC]^{n_4}} \cdot [pFlhB^{total}] \tag{28}$$

$$(9) \Rightarrow \quad \frac{d[(FliA)_{n_9} \bowtie pFliA]}{d\,t} = \begin{aligned} & k_9[FliA]^{n_9}[pFliA] \\ & - k_{-9}[(FliA)_{n_9} \bowtie pFliA] \end{aligned} \tag{29}$$

$$\Rightarrow \quad [(FliA)_{n_9} \bowtie pFliA]_{eq} = \frac{[FliA]^{n_9}}{K_9 + [FliA]^{n_4}} \cdot [pFliA^{total}] \tag{30}$$

$$(10) \Rightarrow \quad \frac{d[(FliA)_{n_{10}} \bowtie pFlhB]}{d\,t} = \begin{aligned} & k_{10}[FliA]^{n_{10}}[pFlhB] \\ & - k_{-10}[(FliA)_{n_{10}} \bowtie pFliA] \end{aligned} \tag{31}$$

$$\Rightarrow \quad [(FliA)_{n_{10}} \bowtie pFlhB]_{eq} = \frac{[FliA]^{n_{10}}}{K_{10} + [FliA]^{n_{10}}} \cdot [pFlhB^{total}] \tag{32}$$

---

specific to pFlhDC-circuit

$$(11) \Rightarrow \quad \frac{d[(FliA)_{n_{11}} \bowtie pFlhDC]}{d\,t} = \begin{aligned} & k_9[FliA]^{n_{11}}[pFlhDC] \\ & - k_{-11}[(FliA)_{n_{11}} \bowtie pFlhDC] \end{aligned} \tag{33}$$

$$\Rightarrow \qquad [(FliA)_{n_{11}} \bowtie pFlhDC]_{eq} = \frac{[FliA]^{n_{11}}}{K_{11} + [FliA]^{n_{11}}} \cdot [pFlhDC^{total}] \tag{34}$$

---

specific to pTet-circuit

$$\begin{aligned} (18) \Rightarrow \quad \tfrac{d[pTet]}{dt} = & \quad - k_{18}[TetR][pTet] \\ & + k_{-18}[(TetR)_{n_{18}} \bowtie pTet] \end{aligned} \tag{35}$$

$$\Rightarrow \qquad [pTet]_{eq} = \frac{K_{18}}{K_{18} + [TetR]^{n_{18}}} \cdot [pTet^{total}] \tag{36}$$

---

specific to pTet-circuit

$$\begin{aligned} (17) \Rightarrow \quad \tfrac{d[TetR]}{dt} = & \quad - k_{17}[TetR][aTc] \\ & + k_{-17}[aTc \bowtie TetR] \end{aligned} \tag{37}$$

$$\Rightarrow \qquad [TetR]_{eq} = \frac{K_{17}}{K_{17} + [aTc]} \cdot [TetR^{produced}] \tag{38}$$

---

specific to pFlhDC-circuit

$$\begin{aligned} (19) \Rightarrow \quad \tfrac{d[pFlhDC]}{dt} = & \quad - k_{19}[OmpR^* \bowtie HSL]^{n_{19}}[pFlhDC] \\ & + k_{-19}[(OmpR^*)_{n_{19}} \bowtie pFlhDC] \end{aligned} \tag{39}$$

$$\Rightarrow \qquad [pFlhDC]_{eq} = \frac{K_{19}}{K_{19} + [OmpR^*]^{n_{19}}} \cdot [pFlhDC^{total}] \tag{40}$$

specific to pTet-circuit

$$(1) \quad and \quad (20) \Rightarrow \quad \frac{d[FlhDC]}{d\,t} = \quad \beta_1[pTet]_{eq} - \gamma_{20}[FlhDC] \tag{41}$$

specific to pFlhDC-circuit

$$(2) \quad and \quad (12) \quad and \quad (20) \Rightarrow \quad \frac{d[FlhDC]}{d\,t} = \quad \beta_2[pFlhDC]_{eq} + \beta_{12}[(FliA)_{n_{11}} \bowtie pFlhDC]_{eq} - \gamma_{20}[FlhDC] \tag{42}$$

$$(5) \quad and \quad (13) \quad and \quad (21) \Rightarrow \quad \frac{d[FliA]}{d\,t} = \quad \beta_5[(FlhDC)_{n_3} \bowtie pFliA]_{eq} + \beta_{13}[(FliA)_{n_9} \bowtie pFliA]_{eq} - \gamma_{21}[FliA] \tag{43}$$

$$(6) \quad and \quad (14) \quad and \quad (22) \Rightarrow \quad \frac{d[FP3]}{d\,t} = \quad \beta_6[(FlhDC)_{n_4} \bowtie pFlhB]_{eq} + \beta_{14}[(FliA)_{n_{10}} \bowtie pFlhB]_{eq} - \gamma_{22}[FP3] \tag{44}$$

specific to pTet-circuit

$$(7) \quad and \quad (15) \quad and \quad (23) \Rightarrow \quad \frac{d[TetR]}{dt} = \quad \beta_6[(FlhDC)_{n_4} \bowtie pFlhB]_{eq} + \beta_{14}[(FliA)_{n_{10}} \bowtie pFlhB]_{eq} - \gamma_{23}[TetR] \tag{45}$$

---

specific to pFlhDC-circuit

$$(8) \quad and \quad (16) \quad and \quad (24) \Rightarrow \quad \frac{d[OmpR^*]}{dt} = \quad \beta_6[(FlhDC)_{n_4} \bowtie pFlhB]_{eq} + \beta_{14}[(FliA)_{n_{10}} \bowtie pFlhB]_{eq} - \gamma_{24}[OmpR^*] \tag{46}$$

$$n_3 FlhDC + pFliL \underset{k_{-47}}{\overset{k_{47}}{\rightleftharpoons}} (FlhDC)_{n_{47}} \bowtie pFliL \qquad K_{47} = \frac{k_{-47}}{k_{47}} \quad (47)$$

$$n_{48} FliA + pFliL \underset{k_{-48}}{\overset{k_{48}}{\rightleftharpoons}} (FliA)_{n_{48}} \bowtie pFliL \qquad K_{48} = \frac{k_{-48}}{k_{48}} \quad (48)$$

---

specific to pFlgA-circuit

$$n_{49} FlhDC + pFlgA \underset{k_{-49}}{\overset{k_{49}}{\rightleftharpoons}} (FlhDC)_{n_{49}} \bowtie pFlgA \qquad K_{49} = \frac{k_{-49}}{k_{49}} \quad (49)$$

---

specific to pFlgA-circuit

$$n_{50} FliA + pFlgA \underset{k_{-50}}{\overset{k_{50}}{\rightleftharpoons}} (FliA)_{n_{50}} \bowtie pFlgA \qquad K_{50} = \frac{k_{-50}}{k_{50}} \quad (50)$$

---

specific to pFlgB-circuit

$$n_{51} FlhDC + pFlgB \underset{k_{-51}}{\overset{k_{51}}{\rightleftharpoons}} (FlhDC)_{n_{51}} \bowtie pFlgB \qquad K_{51} = \frac{k_{-51}}{k_{51}} \quad (51)$$

---

specific to pFlgB-circuit

$$n_{52} FliA + pFlgB \underset{k_{-52}}{\overset{k_{52}}{\rightleftharpoons}} (FliA)_{n_{52}} \bowtie pFlgB \qquad K_{50} = \frac{k_{-52}}{k_{52}} \quad (52)$$

$$(FlhDC)_{n_{47}} \bowtie pFliL \xrightarrow{b_{53}} FP1 + (FlhDC)_{n_{47}} \bowtie pFliL \quad (53)$$

$$(FliA)_{n_{48}} \bowtie pFliL \xrightarrow{b_{54}} FP1 + (FliA)_{n_{48}} \bowtie pFliL \quad (54)$$

---

specific to pFlgA-circuit

$$(FlhDC)_{n_{49}} \bowtie pFlgA \xrightarrow{b_{55}} FP2 + (FlhDC)_{n_{49}} \bowtie pFlgA \tag{55}$$

---

specific to pFlgA-circuit

$$(FliA)_{n_{50}} \bowtie pFlgA \xrightarrow{b_{56}} FP2 + (FliA)_{n_{50}} \bowtie pFlgA \tag{56}$$

---

specific to pFlgB-circuit

$$(FlhDC)_{n_{51}} \bowtie pFlgB \xrightarrow{b_{57}} FP2 + (FlhDC)_{n_{51}} \bowtie pFlgB \tag{57}$$

---

specific to pFlgB-circuit

$$(FliA)_{n_{52}} \bowtie pFlgB \xrightarrow{b_{58}} FP2 + (FliA)_{n_{52}} \bowtie pFlgB \tag{58}$$

$$FP1 \xrightarrow{\gamma_{59}} \emptyset \tag{59}$$

$$FP2 \xrightarrow{\gamma_{60}} \emptyset \tag{60}$$

$$(47) \Rightarrow \quad \frac{d[(FlhDC)_{n_{47}} \bowtie pFliL]}{d\,t} = \quad k_{47}[FlhDC]^{n_{47}}[pFliL] - k_{-47}[(FlhDC)_{n_{47}} \bowtie pFliL] \tag{61}$$

$$\Rightarrow \quad [(FlhDC)_{n_{47}} \bowtie pFliL]_{eq} = \frac{[FlhDC]^{n_{47}}}{K_{47} + [FlhDC]^{n_{47}}} \cdot [pFliL^{total}] \tag{62}$$

$$(48) \Rightarrow \quad \frac{d[(FliA)_{n_{48}} \bowtie pFliL]}{d\,t} = \quad k_{9}[FliA]^{n_{48}}[pFliL] - k_{-48}[(FliA)_{n_{48}} \bowtie pFliL] \tag{63}$$

$$\Rightarrow \quad [(FliA)_{n_{48}} \bowtie pFliL]_{eq} = \frac{[FliA]^{n_{48}}}{K_{48} + [FliA]^{n_{??}}} \cdot [pFliL^{total}] \tag{64}$$

specific to pFlgA-circuit

$$(49) \Rightarrow \quad \frac{d[(FlhDC)_{n_{49}} \bowtie pFlgA]}{d\,t} = \quad k_{49}[FlhDC]^{n_{49}}[pFlgA] - k_{-49}[(FlhDC)_{n_{49}} \bowtie pFlgA] \tag{65}$$

$$\Rightarrow \quad [(FlhDC)_{n_{49}} \bowtie pFlgA]_{eq} = \frac{[FlhDC]^{n_{49}}}{K_{49} + [FlhDC]^{n_{49}}} \cdot [pFlgA^{total}] \tag{66}$$

specific to pFlgA-circuit

$$(50) \Rightarrow \quad \frac{d[(FliA)_{n_{50}} \bowtie pFlgA]}{d\,t} = \quad k_{9}[FliA]^{n_{50}}[pFlgA] - k_{-50}[(FliA)_{n_{50}} \bowtie pFlgA] \tag{67}$$

$$\Rightarrow \quad [(FliA)_{n_{50}} \bowtie pFlgA]_{eq} = \frac{[FliA]^{n_{50}}}{K_{50} + [FliA]^{n_{50}}} \cdot [pFlgA^{total}] \tag{68}$$

specific to pFlgB-circuit

$$(51) \Rightarrow \quad \frac{d[(FlhDC)_{n_{51}} \bowtie pFlgB]}{d\,t} = \quad k_{51}[FlhDC]^{n_{51}}[pFlgB] - k_{-51}[(FlhDC)_{n_{51}} \bowtie pFlgB] \tag{69}$$

$$\Rightarrow \quad [(FlhDC)_{n_{51}} \bowtie pFlgB]_{eq} = \frac{[FlhDC]^{n_{51}}}{K_{51} + [FlhDC]^{n_{51}}} \cdot [pFlgB^{total}] \tag{70}$$

---

specific to pFlgB-circuit

$$(52) \Rightarrow \quad \frac{d[(FliA)_{n_{52}} \bowtie pFlgB]}{d\,t} = \quad k_{??}[FliA]^{n_{52}}[pFlgB] - k_{-52}[(FliA)_{n_{52}} \bowtie pFlgB] \tag{71}$$

$$\Rightarrow \quad [(FliA)_{n_{52}} \bowtie pFlgB]_{eq} = \frac{[FliA]^{n_{52}}}{K_{52} + [FliA]^{n_{52}}} \cdot [pFlgB^{total}] \tag{72}$$

$$(53) \quad and \quad (54) \quad and \quad (59) \Rightarrow \quad \frac{d[FP1]}{dt} = \quad \beta_{53}[(FlhDC)_{n_{47}} \bowtie pFliL] + \beta_{54}[(FliA)_{n_{48}} \bowtie pFliL] - \gamma_{59}[FP1] \tag{73}$$

specific to pFlgA-circuit

$$(55) \quad and \quad (56) \quad and \quad (60) \Rightarrow \quad \frac{d[FP2]}{dt} = \quad \beta_{55}[(FlhDC)_{n_{49}} \bowtie pFlgA] + \beta_{56}[(FliA)_{n_{50}} \bowtie pFlgA] - \gamma_{60}[FP2] \tag{75}$$

specific to pFlgB-circuit

$$(57) \quad and \quad (58) \quad and \quad (60) \Rightarrow \quad \frac{d[FP2]}{dt} = \quad \beta_{57}[(FlhDC)_{n_{51}} \bowtie pFlgB] + \beta_{58}[(FliA)_{n_{52}} \bowtie pFlgB] - \gamma_{60}[FP2] \tag{75}$$