$$
\begin{tikzcd}
\mathrm{A} \arrow[r, shift left, "k_{AD}"] \arrow[d, shift left, "k_{AB}"] \arrow[dr, shift left, "k_{AC}"] & \mathrm{D} \arrow[l, shift left, "k_{DA}"] \arrow[d, shift left, "k_{DC}"] \\
\mathrm{B} \arrow[r, shift left, "k_{BC}"] \arrow[u, shift left, "k_{BA}"] & \mathrm{C} \arrow[l, shift left, "k_{CB}"] \arrow[u, shift left, "k_{CD}"] \arrow[ul, shift left, "k_{CA}"]
\end{tikzcd}
$$

1 asd

$$M_{ij} = k_{ji} - \delta_{ij} \sum_{k=1}^{N} k_{ik}$$

$$\frac{\prod k_{ij}}{\prod k_{ji}} = \exp\left(\frac{\Delta\mu}{T}\right)$$

$$X(t) \in \mathbb{N}$$

$$\frac{d}{dt}\langle X^k(t)\rangle = \sum_{x,y\in\mathbb{N}} p_x(t) w_{xy} \left(y^k - x^k\right)$$

$$w_{xy} = w_{\Delta x = y-x} = \sum_{(i\to j)\in R_{\Delta x}} p_i(t) k_{ij}$$

$$\langle X(t)\rangle = t \sum_{\Delta x, R_{\Delta x}} \Delta x p_i(t) k_{ij} \left(+\langle X(0)\rangle\right)$$

$$\mathrm{Var}\left(X(t)\right) = t \sum_{\Delta x, R_{\Delta x}} (\Delta x)^2 p_i(t) k_{ij} \left(+\mathrm{Var}\left(X(0)\right)\right)$$

$$\tau \sim \mathrm{Exp}(k_i)$$

$$j^* \sim \mathrm{WeightedSampling}\left(\frac{k_{ij^*}}{k_i}\right)$$

$$k_i := \sum_j k_{ij}$$

$$\frac{k_{DT}}{k_{TD}} = \left.\frac{k_{DT}}{k_{TD}}\right|_{eq.} \left(\frac{[T]}{[D]} \middle/ \left.\frac{[T]}{[D]}\right|_{eq.}\right) \tag{1}$$

$$\Delta\mu \propto \log\left(\frac{[T]}{[D]} \middle/ \left.\frac{[T]}{[D]}\right|_{eq.}\right)$$

$$
\begin{aligned}
&r_{ATP} \propto \left(1 - \left.\frac{[T]}{[D]}\right|_{eq.} \Big/ \frac{[T]}{[D]}\right) k_h k_\uparrow k_{DT} \\
&\langle v \rangle = \Delta x \cdot r_{ATP}
\end{aligned}
\tag{2}
$$

$$
\begin{aligned}
&\mathcal{L} = \frac{1}{2} k \sum_{i=1}^{N-1} (h_i - h_0)^2 + \frac{1}{2} k' (h_N - h_0)^2 - \lambda \sum_{i=1}^{N} h_i \\
&\implies \begin{cases} h_{i \neq N} = h_0 \frac{k-k'}{(N-1)k'+k}, \\ h_N = -(N-1) h_{i \neq N} \end{cases}
\end{aligned}
\tag{3}
$$

$$
\begin{tikzcd}
A \arrow[r, shift left, "\bar{k}_{\downarrow ext.}"] \arrow[d, shift left, "\bar{k}_h"] & D \arrow[l, shift left, "k_{\uparrow cont.}"] \arrow[d, shift left, "k_{TD}"] \\
B \arrow[u, shift left, "k_s"] \arrow[r, shift left, "k_{\uparrow ext.}"] & C \arrow[l, shift left, "k_{\downarrow cont.}"] \arrow[u, shift left, "k_{DT}"]
\end{tikzcd}
$$

$$
\Delta h = 2 \implies \Delta x = 10
$$

$$
\begin{aligned}
&r_{ATP} \propto \left(1 - \left.\frac{[T]}{[D]}\right|_{eq.} \Big/ \frac{[T]}{[D]}\right) \bar{k}_h k_{\uparrow ext.} k_{DT} k_{\uparrow cont.} \\
&\langle v \rangle = \Delta x \cdot r_{ATP}
\end{aligned}
\tag{4}
$$

$$
\begin{aligned}
&r_{ATP} \propto \left(1 - \left.\frac{[T]}{[D]}\right|_{eq.} \Big/ \frac{[T]}{[D]}\right) \prod k \\
&\langle v \rangle = \Delta x \cdot r_{ATP}
\end{aligned}
\tag{5}
$$

$$
\begin{tikzcd}
A \arrow[d, shift left, "k_h"] \arrow[d, bend left=60, "k_{TD}"] \\
B \arrow[u, shift left, "k_s"]
\end{tikzcd}
$$

$$\begin{cases} p_A \propto k_s k_{DT} + k_\downarrow k_s + k_\uparrow k_{DT} \\ p_B \propto k_h k_\downarrow + k_{DT} k_h + k_{TD} k_\downarrow \\ p_C \propto k_\uparrow k_{TD} + k_s k_{TD} + k_h k_\uparrow \end{cases} \tag{6}$$

$$\begin{cases} p_A \propto k_s \\ p_B \propto k_h + k_{TD} \end{cases} \tag{7}$$

$$k, k'$$

$$\begin{cases} \dfrac{d[\mathrm{PT}]}{dt} = k_{on}^T [\mathrm{P}][\mathrm{T}] - k_{off}^T [\mathrm{PT}] \\ \dfrac{d[\mathrm{PD}]}{dt} = k_{on}^D [\mathrm{P}][\mathrm{D}] - k_{off}^D [\mathrm{PD}] \\ \dfrac{d[\mathrm{P}]}{dt} = k_{off}^T [\mathrm{PT}] + k_{off}^D [\mathrm{PD}] - (k_{on}^T + k_{on}^D)[\mathrm{P}] \end{cases} \tag{8}$$