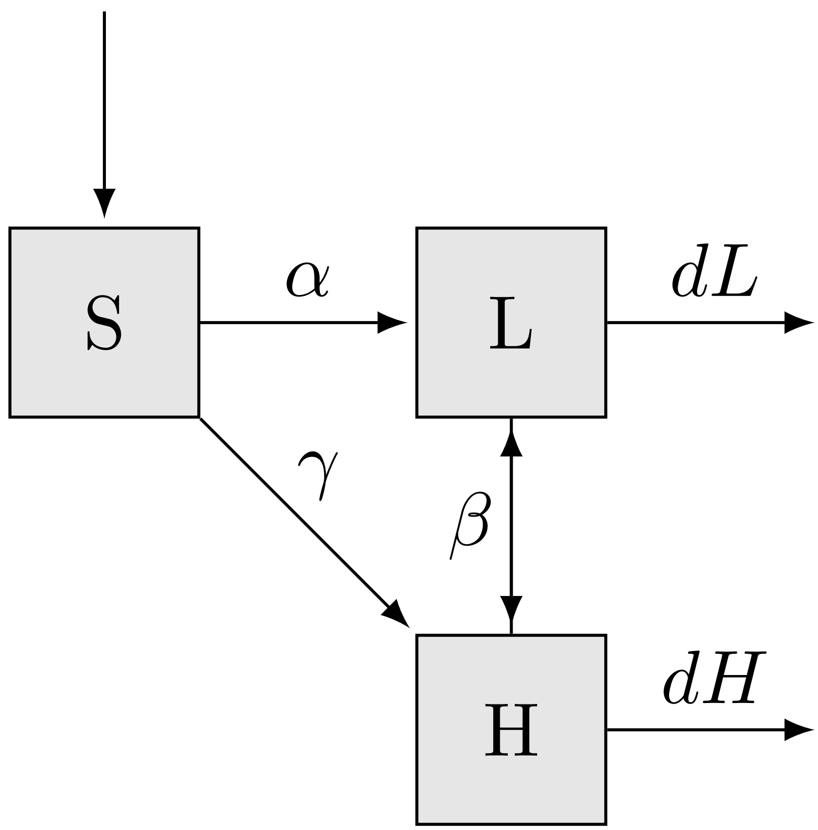

Model Explanation

There are two ideas presented here. The first is that the number of initiates is entirely dependent on the number of initiators and that since we have divided initiators into Low- and High-Rate Initiators, there is in theory, some threshold rate of initiation which makes a distinction between L and H. Thus we present λ_L and λ_H as the average number of initiates per initiator for the given time-step the model is being run on. The second is that the number of high initiators is perhaps dependent on the number of low-initiators, thus we set η as a constant which represents a proportion of L to H which the model shall seek to maintain.

$\alpha : L(t) * \lambda_L + H(t) * \lambda_H$

$\beta : -\frac{\eta * H(t) - L(t)}{\eta+1}$, $\beta > 0$ indicates a transition from L to H and a $\beta < 0$ indicates a transition from H to L

$\gamma : 0$

η : a set constant which $\frac{L(t)}{H(t)}$ maintains

λ_L = the average number of initiates for a Low-Risk Initiator

λ_H = the average number of initiates for a High-Risk Initiator

$dL : L(t) * x_L$ where x_L represents the "death" rate of this pop

$dH : H(t) * x_H$ where x_H represents the "death" rate of this pop

$$\begin{aligned}
L(t+1) &= L(t) + \alpha - \beta - dL \\
&= L(t) + L(t) * \lambda_L + H(t) * \lambda_H - (-\frac{\eta * H(t) - L(t)}{\eta + 1}) - L(t) * x_L \\
&= L(t) + L(t) * \lambda_L + H(t) * \lambda_H + \frac{\eta * H(t) - L(t)}{\eta + 1} - L(t) * x_L \\
&= L(t)(1 + \lambda_L - \frac{1}{\eta + 1} - x_L) + H(t)(\lambda_H + \frac{\eta}{\eta + 1}) \\
H(t+1) &= H(t) + \beta + \gamma - dH \\
&= H(t) + (-\frac{\eta * H(t) - L(t)}{\eta + 1}) + 0 - H(t) * x_H \\
&= H(t) - \frac{\eta * H(t) - L(t)}{\eta + 1} - H(t) * x_H \\
&= H(t)(1 - \frac{\eta}{\eta + 1} - x_H) + L(t)(\frac{1}{\eta + 1})
\end{aligned}$$