i always refers to different species
a and b to resources

external supply

degradation

consumption rate of α by i, per unit α per cell

determines the byproducts created when i consumes b

total leakage of b when consumed by i

resource concentrations

$$\frac{\partial R_\alpha}{\partial t} = K_\alpha - r_\alpha R_\alpha - \sum_i \underbrace{N_i c_{i\alpha} R_\alpha}_{\text{total consumption of } \alpha \text{ by } i} + \sum_{i,\beta} \frac{w_\beta}{w_\alpha} D_{i\alpha\beta}\, l_{i\beta}\, \underline{N_i c_{i\beta} R_\beta} + D_{R_\alpha} \nabla^2 R_\alpha$$

chemostat terms

unit conversion factors

diffusion constants

species concentrations

$$\frac{\partial N_i}{\partial t} = N_i g_i \left(\sum_\alpha (1 - l_{i\alpha}) w_\alpha c_{i\alpha} R_\alpha - m_i \right) + D_{N_i} \nabla^2 N_i$$

cell upkeep energy consumptionl

supply and consumption of R