Integral ODE model of reaction:

$$\frac{d[A_f]}{dt} = 2k_1[G_f][A_f] - \frac{k_p[A]}{[A] + K_m}$$

$$\frac{d[G_f]}{dt} = V_{in} - k_1[G_f][A_f]$$

$$[G_f] = \frac{\int_\Omega G_p(x)dx}{Vol(\Omega)}, \Omega \subset \mathbb{R}^n$$

$$[A_f] = \frac{\int_\Omega A_p(x)dx}{Vol(\Omega)}, \Omega \subset \mathbb{R}^n$$

$$V_{in}(t) = \int_{\delta\Omega} V_p(x,t)dx, \delta\Omega - \text{boundary of } \Omega$$

Problem.

What are generic solution for $A_p(x)$ and $G_p(x)$?

Model.

RD model

Our model based on the graph sequence whose elements are so called flow graphs. The main property of these graphs is that all of them have the same set of vertices V

Suppose G is directed graph that have N vertices. Some of the vertices are connected with oriented edges (also called arrows). Arrow between two vertices is associated with material flow between them.

Reaction $A+B \leftrightarrows C+D$ is associated with four graphs G_A, G_B, G_C, G_D.