F04

Volterra-Lotka ekvationssystem

"predator-prey system"

$$\begin{cases} \dot{u}_1(t) = u_1(t)(\alpha - \beta u_2(t)) \\ \dot{u}_2(t) = -u_2(t)(\gamma - \delta u_1(t)) \end{cases}$$

u_1 - prey , u_2 - predator

- Chemical reactions, population dynamics economics (competing industries etc.)

~~Förbränning av metan~~

~~$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$~~

Ex: Kemisk reaktion

1. $A + B \rightarrow 2B$
2. $B + C \rightarrow 2C$
3. $C \rightarrow D$

DE-system

$$\begin{cases} \dot{A}(t) = -k_1 A(t) B(t) \\ \dot{B}(t) = k_1 A(t) B(t) \end{cases}$$

$$\begin{cases} \dot{B}(t) = -k_2 B(t) C(t) \\ \dot{C}(t) = k_2 B(t) C(t) \end{cases}$$

$$\begin{cases} \dot{C}(t) = -k_3 C(t) \\ \dot{D}(t) = k_3 C(t) \end{cases}$$

$$u(t) = \begin{bmatrix} A(t) \\ B(t) \\ C(t) \\ D(t) \end{bmatrix}$$

$$\begin{cases} \dot{u}_1(t) = -k_1 u_1(t) u_2(t) \\ \dot{u}_2(t) = k_1 u_1(t) u_2(t) - k_2 u_2(t) u_3(t) \\ \dot{u}_3(t) = k_2 u_2(t) u_3(t) - k_3 u_3(t) \\ \dot{u}_4(t) = k_3 u_3(t) \end{cases}$$