Existence and convergence to equilibrium for a class of reaction diffusion systems

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The talk concerns a class of reaction diffusion systems coupled with reaction on the boundary which satisfies a mass conservation,

$$\begin{cases} u_t - \delta_u \Delta u = 0, & x \in \Omega \\ \delta_u \frac{\partial u}{\partial \nu} = -\alpha(k_u u^\alpha - k_v v^\beta), & x \in \partial\Omega, \\ v_t - \delta_v \Delta_{\partial\Omega} v = \beta(k_u u^\alpha - k_v v^\beta), & x \in \partial\Omega, \\ u(0,x) = u_0(x) \geq 0, & x \in \Omega, \\ v(0,x) = v_0(x) \geq 0, & x \in \partial\Omega. \end{cases}$$

This system can be considered as a simplified model of stem cell division. The existence of a unique solution of the system is proved by using an iteration method based on an appropriate comparison principle. The long time asymptotic, more precisely, the convergence to equilibrium is obtained by using the so-called method "entropy-entropy dissipation".