

Existence of global solutions for some reaction-diffusion system

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Abstract. We consider the Cauchy problem for the following reaction-diffusion system

$$\begin{cases} \frac{\partial u_i}{\partial t} = \Delta u_i + g_i(x, t)u_{i-1}^{p_i}, & x \in \mathbf{R}^n, t > 0, i = 1, 2, \dots, N, \\ u_i(x, 0) = f_i(x), & x \in \mathbf{R}^n, i = 1, 2, \dots, N, \end{cases}$$

where $N \geq 2$, $u_0 = u_N$, $n \geq 3$, $p_i \geq 1$ and f_i ($i = 1, 2, \dots, N$) are non-negative, bounded and continuous functions in \mathbf{R}^n . Our purpose is to show that $u_i(x, t) \geq 0$ ($i = 1, 2, \dots, N$) exist globally in time for the above Cauchy problem when g_i ($i = 1, 2, \dots, N$) satisfy some conditions.