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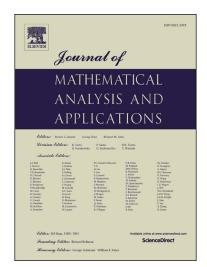
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Global boundedness in a fully parabolic quasilinear chemotaxis system with singular sensitivity*

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Abstract. In this paper we study the global boundedness of solutions to the quasilinear fully parabolic chemotaxis system: $u_t = \nabla \cdot (D(u)\nabla u - S(u)\nabla \varphi(v)), \ v_t = \Delta v - v + u$, where bounded domain $\Omega \subset \mathbb{R}^n$ $(n \geq 2)$ subject to the non-flux boundary conditions, the diffusivity fulfills $D(u) = a_0(u+1)^{-\alpha}$ with $a_0 > 0$ and $\alpha \geq 0$, while the density-signal governed sensitivity satisfies $0 \leq S(u) \leq b_0(u+1)^{\beta}$ and $0 < \varphi'(v) \leq \frac{\chi}{v^k}$ for $b_0, \chi > 0$ and $\beta, k \in \mathbb{R}$. It is shown that the solution is globally bounded provided $\alpha + \beta < 1$ and $k \leq 1$. This result demonstrates the effect of signal-dependent sensitivity on the blow-up prevention.

Keywords: Chemotaxis; Nonlinear diffusion; Global boundedness; Signal-dependent sensitivity

Mathematics Subject Classification: 92C17; 35K55; 35B35; 35B40

1 Introduction

In this article, we study the following parabolic-parabolic Keller-Segel system

$$\begin{cases}
 u_t = \nabla \cdot (D(u)\nabla u) - \nabla \cdot (S(u)\nabla \varphi(v)), & x \in \Omega, t > 0, \\
 v_t = \Delta v - v + u, & x \in \Omega, t > 0, \\
 \frac{\partial u}{\partial \nu} = \frac{\partial v}{\partial \nu} = 0, & x \in \partial\Omega, t > 0, \\
 u(x,0) = u_0(x), v(x,0) = v_0(x), & x \in \Omega,
\end{cases}$$
(1.1)

where Ω is a bounded domain in \mathbb{R}^n $(n \geq 2)$ with smooth boundary, $\frac{\partial}{\partial \nu}$ denotes the derivative with respect to the outer normal of $\partial \Omega$. u and v stand for the cell density, the concentration of an attractive signal produced by cells themselves respectively. Initial data u_0 and v_0 fulfill

$$\begin{cases} u_0 \in C(\bar{\Omega}), & u_0 \ge 0 \text{ in } \bar{\Omega}, \quad u_0 \ne 0, \\ v_0 \in W^{1,\infty}(\Omega), & v_0 > 0 \text{ in } \bar{\Omega}. \end{cases}$$
 (1.2)

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