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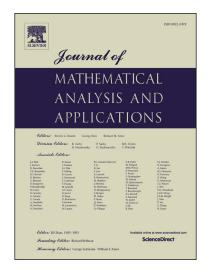
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### **ACCEPTED MANUSCRIPT**

# A parabolic-elliptic attraction-repulsion chemotaxis system with logistic source

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#### Abstract

This paper deals with the parabolic-elliptic-elliptic attraction-repulsion chemotaxis system with logistic source

$$\begin{cases} u_t = \nabla \cdot (D(u)\nabla u) - \nabla \cdot (\chi u \nabla v) + \nabla \cdot (\xi u \nabla w) + ru - \mu u^2, & x \in \Omega, \ t > 0, \\ 0 = \Delta v + \alpha u - \beta v, & x \in \Omega, \ t > 0, \\ 0 = \Delta w + \gamma u - \delta w, & x \in \Omega, \ t > 0, \end{cases}$$

under no-flux boundary conditions in bounded domain with smooth boundary, where  $\chi, \xi, \alpha, \beta, \gamma, \delta, r$  and  $\mu$  are assumed to be positive.

When  $\Omega \subseteq \mathbb{R}^3$ , D(u) is assumed to satisfy D(0) > 0,  $D(u) \ge c_D u^{m-1}$  with  $m \ge 1$  and  $c_D > 0$ , it is proved that if  $\chi \alpha - \xi \gamma > 0$  and  $\mu = \frac{1}{3}(\chi \alpha - \xi \gamma)$ , then for any given  $u_0 \in W^{1,\infty}(\Omega)$ , the system possesses a global and bounded classical solution. For the case where  $D(u) \equiv 1$  and  $n \ge 3$ , the convergence rate of the solution is established. When the random motion of the chemotactic species is neglected i.e.  $(D(u) \equiv 0)$  and  $\Omega \subset \mathbb{R}^n$   $(n \ge 2)$  is a convex domain, boundedness and the finite time blow up of the solution are investigated.

**Keywords**: Chemotaxis; Boundedness; Blow up; Asymptotic behavior; Logistic source **AMS(2010) Subject Classification**: 92C17; 34K12; 35K55; 35B40; 35B44

#### 1 Introduction

Chemotaxis is an interesting phenomenon which is used to measure the movement of cells in response to chemical substance. In 1970, Keller and Segel [8] (see also [7,9]) introduced a model to describe the collective behavior of cells type which can be read as follows

$$\begin{cases} u_{t} = \nabla \cdot (D(u)\nabla u) - \nabla \cdot (\chi u \nabla v) + f(u), & x \in \Omega, \ t > 0, \\ \tau v_{t} = \Delta v + u - v, & x \in \Omega, \ t > 0, \\ \frac{\partial u}{\partial \nu} = \frac{\partial v}{\partial \nu} = 0, & x \in \partial \Omega, \ t > 0, \\ u(x, 0) = u_{0}(x), \ \tau v(x, 0) = v_{0}(x), & x \in \Omega, \end{cases}$$

$$(1.1)$$

where u(x,t) denotes the density of cells and v(x,t) represents the concentration of the chemoattractant. The function  $f:[0,\infty)\to\mathbb{R}$  is smooth and fulfills f(0)>0.  $\chi>0$  is a parameter referred to as chemosensitivity.

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