



Existence Result for Positive Solution of a Degenerate Reaction-Diffusion System via a Method of Upper and Lower Solutions

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Abstract: The aim of this paper is to prove the existence of positive maximal and minimal solutions for a class of degenerate elliptic reaction-diffusion systems, including the uniqueness of the positive solution. To answer these questions, we use a technique described by Pao based on the method of upper and lower solutions, its associated monotone interactions and various comparison principles.

Keywords: *reaction-diffusion systems; degenerate elliptic systems; upper and lower solutions.*

Mathematics Subject Classification (2010): 35J62, 35J70, 35K57.

1 Introduction

Reaction-diffusion systems are widely used in biology, ecology, engineering, physics and chemistry. What we observe in modern scientific studies is the great interest of scientists in studying this type of systems; this confirms once again its importance in the development of applied and technological sciences. Various models and real examples can be found in various scientific fields, see Murray [13, 14]. The propagation of epidemics (Coronavirus, Hepatitis, ...), population dynamics, migration of biological species are among many examples of such phenomena. There are many methods and techniques for studying these issues. The reader can see some of them in the works of Alaa and Mesbahi [2, 3, 11, 12], Abbassi et al. [1], Lions [10], Raheem [19] and the references therein.

In recent years, special attention has been paid to degenerate systems. However, most of the discussions relate to systems of two equations of the porous reaction medium type

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