



On the Existence of Periodic Solutions of a Degenerate Parabolic Reaction-Diffusion Model

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Abstract: The aim of this paper is to study a degenerate parabolic reaction-diffusion model with nonlinear boundary conditions. Its specificity lies in the introduction of degenerate diffusion. We prove the existence of maximal and minimal periodic solutions, including the uniqueness of the solution. This model appears in the modeling of many periodic diffusion phenomena in various sciences. Our approach towards our goal is through the method of upper and lower solutions.

Keywords: *reaction-diffusion systems; degenerate parabolic systems; nonlinear dynamics; upper and lower solutions.*

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1 Introduction

Many problems arise in biology, chemistry, applied science and engineering in the form of periodic reaction-diffusion models. This has been observed in recent scientific studies. Different models can be found in Murray [12,13]. As for the mathematical methods used, some of them are found in the works of Alaa and Mesbahi et al. [2,3,10,11,17], and also in Pao [16].

In recent years, special attention has been paid to degenerate reaction-diffusion systems with specific diffusion coefficients and reaction functions, either in the elliptical or parabolic case, as it is in our work. This is due to their wide applications in various sciences. Our work will be in this context; we will prove the existence of periodic maximal

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